Supplemental data to 'Genome scaffolding with PE-contaminated mate-pair libraries'

Contents

1 Insert-size distributions **3**

2 How the scaffolders were run **5**
2.1 BESST(-v2) . . . 5
2.2 SSPACE . . . 5
2.3 SCARPA . . . 5
2.4 SCAFFMATCH . . . 6
2.5 SOPRA . . . 6
2.6 OPERA . . . 6

3 Quality indicators: relative numbers **7**
3.1 Relative quality: sim, c=30 . . . 7
3.2 Relative quality: assemblathon3k, c=20 . . . 7
3.3 Relative quality: staph, c=0 . . . 8
3.4 Relative quality: staph, c=15 . . . 9
3.5 Relative quality: staph, c=40 . . . 10
3.6 Relative quality: rhodo, c=0 . . . 12
3.7 Relative quality: rhodo, c=15 . . . 14
3.8 Relative quality: rhodo, c=40 . . . 16
3.9 Relative quality: rhodo_wide_N100 . . . 18
3.10 Relative quality: rhodo_wide_N1000 . . . 20
3.11 Relative quality: hs14, c=0 . . . 22
3.12 Relative quality: hs14, c=15 . . . 24
3.13 Relative quality: hs14, c=40 . . . 25
3.14 Relative quality: ecoli_wide, N=100 . . . 26
3.15 Relative quality: ecoli_wide, N=1000 . . . 27

4 Detailed quality tables **28**
4.1 Quality indicators: sim, c=30 . . . 28
4.2 Quality indicators: assemblathon3k, c=20 . . . 28
4.3 Quality indicators: staph, c=0 . . . 29
4.4 Quality indicators: staph, c=15 . . . 30
4.5 Quality indicators: staph, c=40 . . . 31
4.6 Quality indicators: rhodo, c=0 . . . 32
4.7 Quality indicators: rhodo, c=15 . . . 33
4.8 Quality indicators: rhodo, c=40 . . . 34
4.9 Quality indicators: rhodo_wide, N=100 . . . 35
4.10 Quality indicators: rhodo_wide_N=1000 . . . 36
4.11 Quality indicators: hs14, c=0 . . . 37
4.12 Quality indicators: hs14, c=15 . . . 38
4.13 Quality indicators: hs14, c=40 . . . 39
4.14 Quality indicators: ecoli_wide, N=100 . . . 40
4.15 Quality indicators: ecoli_wide, N=1000 . . . 41

5 Runtime and memory **42**
5.1 sim, c=30 . . . 42
5.2 assemblathon3k, c=20 . . . 42
5.3 staph, c=0 . . . 43
5.4 staph, c=15 . . . 44
5.5 staph, c=40 . . . 45
5.6 rhodo, c=0 . . . 46
5.7 rhodo, c=15 . . . 47
5.8 rhodo, c=40 . . . 48
5.9 rhodo_wide . . . 49
5.10 hs14, c=0 . . . 50
5.11 hs14, c=15 . . . 51
5.12 hs14, c=40 . . . 52
5.13 ecoli_wide . . . 53

6 BESST-v1 vs BESST-v2 **54**

7 Wide MP libraries **56**

8 Additional fragmented assembly investigation **57**

1 Insert-size distributions

The mate-pair insert-size distributions were inferred by mapping reads to the reference assemblies. Blue bars represent pairs mapped as mate-pairs (RF) and red are pairs mapped as paired-end (FR).

Figure SS3 and SS5 are discussed in section S7.

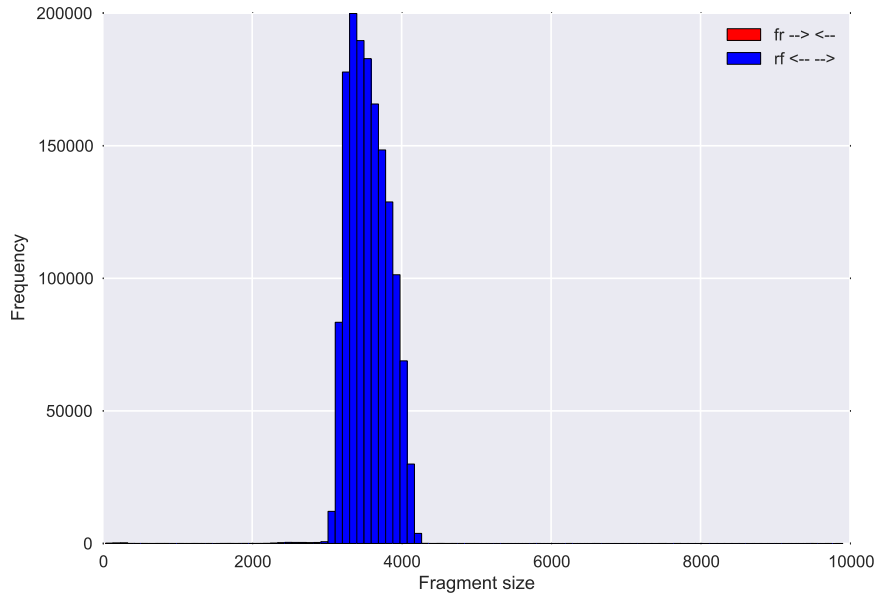
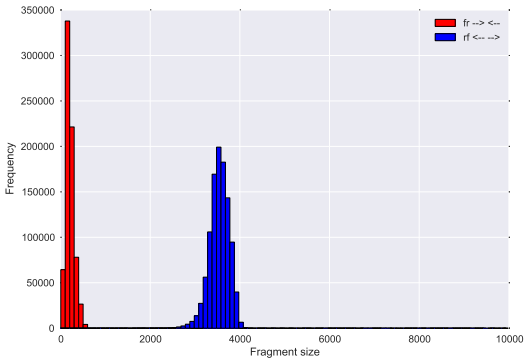


Figure S1: Insert-size distribution for "staph". Full library. No contamination is revealed.

(a)



(b)

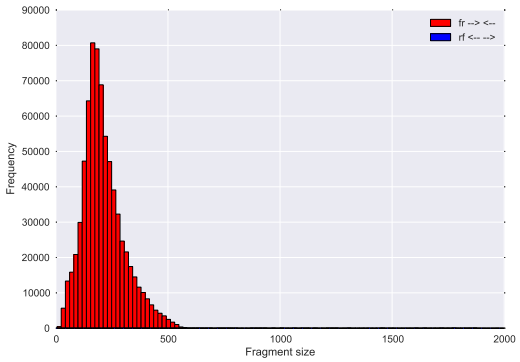


Figure S2: Insert-size distribution for "rhodo". (a) Full library. (b) Zoomed to focus on the PE distribution.

(a) (b)

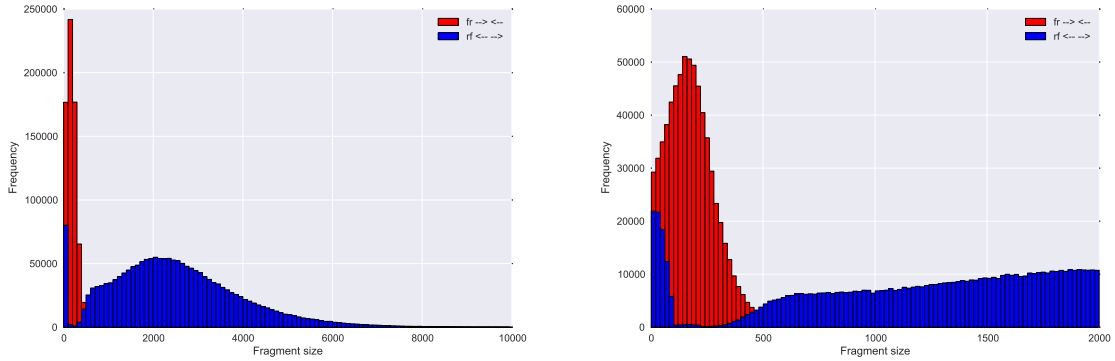


Figure S3: Insert-size distribution for "rhodo_wide". (a) Full library. (b) Zoomed to focus on the PE distribution.

(a) (b)

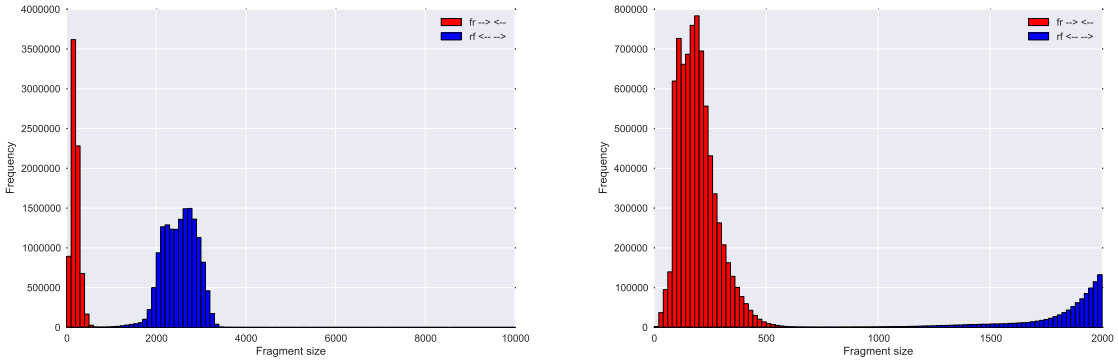


Figure S4: Insert-size distribution for "hs14". (a) Full library. (b) Zoomed to focus on the PE distribution.

(a) (b)

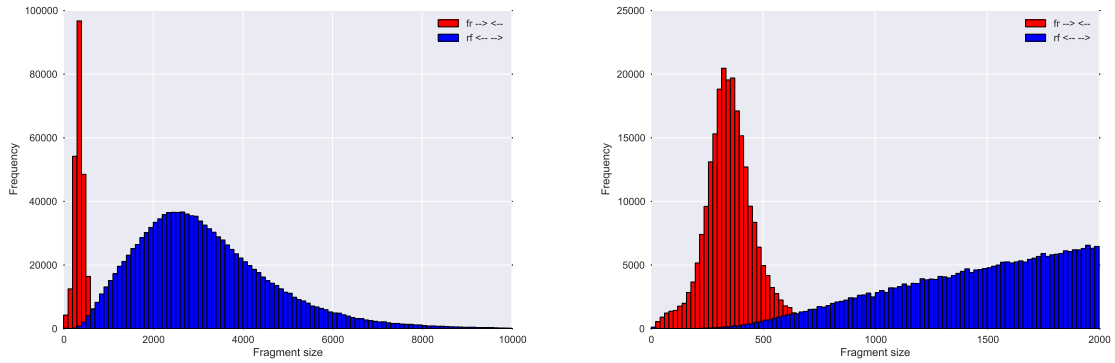


Figure S5: Insert-size distribution for ecoli_wide. (a) Full library. (b) Zoomed to focus on the PE distribution.

2 How the scaffolders were run

For each available GAGE assembly (in contig version) we used 4 different stand-alone scaffolders:

- BESST v1.0.4.2
- BESST-v2 v1.3.8
- SSPACE v3.0
- SCARPA v0.241
- SCAFFMATCH v0.9
- OPERA v1.4
- SOPRA v1.4.6

For scaffolders requiring specification of insert size of library, the information in Table S1 was used.

Organism	Mean	SD
staph	3630	259
rhodo	3700	208
Hs14	2700	355
rhodo_wide	2518	1465
assemblathon3k	3000	300
sim	3000	300
ecoli_wide	3152	1516

Table S1: Insert size specification

Reads were reverse complemented (making MPs have forward reverse order) as some scaffolders requires this orientation. All scaffolders were run with as little parameters specified as possible.

2.1 BESST(-v2)

Assuming BESST-v2 is installed with pip or easy_install (other wise run BESST-v2 from directory where "runBESST" exists). BESST-v2 has automated inference of library insert size distribution.

```
$ runBESST-v2 -c /path/to/contigs.fasta -f /path/to/BAM_file \
    -o /path/to/output
```

For BESST-v2 we ran the command

```
$ runBESST-v2 -c /path/to/contigs.fasta -f /path/to/BAM_file \
    -o /path/to/output --orientation fr
```

For the separate analysis of the fragmented assemblies ABySS and SGA with rhodo_wide, the parameters "–no_score -T 9000 -k 3000" were provided. For SPADES_10x with ecoli_wide we provided "–no_score -T 8000 -k 5000"

2.2 SSPACE

'library.txt' is a text file containing information about the libraries in the following format

```
lib1 bowtie /path/to/frag1.fa /path/to/frag2.fa <insert> 0.3 FR
```

(for the wide rhodo MP library, we specified 0.95 as the allowed error of the mean insert size)

```
SSPACE -l library.txt -s /path/to/contigs -b /path/to/sspace_output
```

2.3 SCARPA

The wrapper from Martin Hunt (`https://github.com/martinghunt/Scaffolder-evaluation/blob/master/Wrapper-scripts/scaffold-wrapper-scarpa.pl`) was named "SCARPA" and added to path. Thereafter we run SCARPA as

```
SCARPA -bin /home/kris/bin/ <contigs> <reads> <outdir> <insert> bowtie -mapper_ops "-m 1 -
```

As suggested by Hunt *et al.* (2014). Where `<reads>` are one file containing interleaved pairs on fr format.

2.4 SCAFFMATCH

```
scaffmatch  -w <outpath> -c <contigs>  \
    -1 <reads1> -2 <reads2> -i <insert> -p fr -s <stddev>
```

The parameter "-g greedy" was added to six runs, as the default mode did not finish before 24h (ABySS and SGA runs on hs14 for all $c = 0, 15, 40$).

2.5 SOPRA

The wrapper from Martin Hunt (`https://github.com/martinghunt/Scaffolder-evaluation/blob/master/Wrapper-scripts/scaffold-wrapper-sopra.pl`) was named "SOPRA" and added to path. Thereafter we run SOPRA as

```
SOPRA -bin /home/kris/bin  <contigs> bowtie <reads1> <reads2> 10000 <insert> <outdir> -map
"-m 1 -v 0"
```

As suggested by Hunt *et al.* (2014).

2.6 OPERA

Assuming opera is in your system path:

```
$ perl /path/to/operafolder/opera_v1.4/bin/preprocess_reads.pl \
  /path/to/contigs /path/to/reads1 /path/to/reads2 \
  /path/to/outdir/<mapped.bam> "bowtie"
$ opera  /path/to/contigs  /path/to/outdir/mapped.bam /path/to/outdir
```

3 Quality indicators: relative numbers

In this section we give the full listings of quality indicators, as used in the main paper, Tables 1–7. These figures are, in turn, based on the data listed in section 4.

3.1 Relative quality: sim, c=30

Table S2

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.002	0	130.9
OPERA	1.0	0	1.0
SCARPA	1.015	9	5.4
SCAFFMATCH	2.066	95	2.5
SOPRA	1.179	73	2.0
SSPACE	1.435	1	5.5
BESST	1.37	199	2.4
ORIGINAL	1.0	0	1.0

3.2 Relative quality: assemblathon3k, c=20

Table S3

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.015	2167	21.9
OPERA	1.015	10 161	1.7
SCARPA	1.002	376	1.0
SCAFFMATCH	1.2	34 124	1.0
SOPRA	1.092	19 632	1.1
SSPACE	1.11	26 410	1.0
BESST	1.137	13 229	4.6
ORIGINAL	1.0	0	1.0

3.3 Relative quality: staph, c=0

Table S4

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.009	17	4.9
ABySS2	BESST-v2	1.002	16	1.4
Bambus2	BESST-v2	1.011	14	2.1
Allpaths-LG	BESST-v2	1.005	5	5.9
MSR-CA	BESST-v2	1.003	24	2.6
SGA	BESST-v2	1.084	16	69.7
SOAPdenovo	BESST-v2	1.006	15	1.1
Velvet	BESST-v2	1.012	25	2.7
TOTAL	BESST-v2	8.132	132	90.4
AVERAGE	BESST-v2	1.017	16.5	11.3
ABySS	OPERA	1.004	7	1.0
ABySS2	OPERA	1.0	0	1.0
Bambus2	OPERA	1.012	19	2.0
Allpaths-LG	OPERA	1.005	10	6.5
MSR-CA	OPERA	1.005	22	2.9
SGA	OPERA	1.036	22	74.1
SOAPdenovo	OPERA	1.008	18	1.1
Velvet	OPERA	1.016	18	3.0
TOTAL	OPERA	8.086	116	91.6
AVERAGE	OPERA	1.011	14.5	11.45
ABySS	SCARPA	1.002	23	1.5
ABySS2	SCARPA	1.001	14	1.1
Bambus2	SCARPA	1.004	11	1.5
Allpaths-LG	SCARPA	1.003	8	2.4
MSR-CA	SCARPA	1.002	3	1.4
SGA	SCARPA	1.037	65	1.7
SOAPdenovo	SCARPA	1.004	7	1.0
Velvet	SCARPA	1.004	17	1.4
TOTAL	SCARPA	8.057	148	12.0
AVERAGE	SCARPA	1.007	18.5	1.5
ABySS	SCAFFMATCH	1.035	135	2.2
ABySS2	SCAFFMATCH	1.003	19	1.3
Bambus2	SCAFFMATCH	1.018	29	1.8
Allpaths-LG	SCAFFMATCH	1.006	12	6.6
MSR-CA	SCAFFMATCH	1.007	32	2.9
SGA	SCAFFMATCH	1.279	377	3.3
SOAPdenovo	SCAFFMATCH	1.019	36	1.1
Velvet	SCAFFMATCH	1.024	77	2.0
TOTAL	SCAFFMATCH	8.391	717	21.2
AVERAGE	SCAFFMATCH	1.049	89.625	2.65
ABySS	SOPRA	1.011	28	3.9
ABySS2	SOPRA	1.002	14	1.3
Bambus2	SOPRA	1.007	10	1.5
Allpaths-LG	SOPRA	1.003	5	4.6
MSR-CA	SOPRA	1.004	14	2.0
SGA	SOPRA	1.028	99	20.8
SOAPdenovo	SOPRA	1.005	7	1.1
Velvet	SOPRA	1.012	10	2.2
TOTAL	SOPRA	8.072	187	37.4
AVERAGE	SOPRA	1.009	23.375	4.675
ABySS	SSPACE	1.008	14	2.7
ABySS2	SSPACE	1.002	6	1.7
Bambus2	SSPACE	1.013	12	2.3
Allpaths-LG	SSPACE	1.005	3	7.4
MSR-CA	SSPACE	1.004	20	2.9
SGA	SSPACE	1.089	94	3.9
SOAPdenovo	SSPACE	1.005	9	1.1
Velvet	SSPACE	1.012	26	2.6
TOTAL	SSPACE	8.138	184	24.6
AVERAGE	SSPACE	1.017	23.0	3.075
ABySS	BESST	1.009	17	4.9
ABySS2	BESST	1.002	16	1.4
Bambus2	BESST	1.011	14	2.1
Allpaths-LG	BESST	1.005	5	5.9
MSR-CA	BESST	1.003	24	2.6
SGA	BESST	1.084	16	69.7
SOAPdenovo	BESST	1.006	15	1.1
Velvet	BESST	1.012	25	2.7
TOTAL	BESST	8.132	132	90.4
AVERAGE	BESST	1.017	16.5	11.3
ABySS	INTEGRATED	1.015	7	1.1
ABySS2	INTEGRATED	1.002	7	1.1
Bambus2	INTEGRATED	1.01	50	1.2
Allpaths-LG	INTEGRATED	1.003	19	2.6
MSR-CA	INTEGRATED	1.004	34	2.8
SGA	INTEGRATED	0.907	9	22.7
SOAPdenovo	INTEGRATED	1.002	2	1.1
Velvet	INTEGRATED	1.006	59	1.8
TOTAL	INTEGRATED	7.949	187.0	34.4
AVERAGE	INTEGRATED	0.994	23.375	4.3
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	8.0	0	8.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.017	16.5	11.3
OPERA	1.011	14.5	11.45
SCARPA	1.007	18.5	1.5
SCAFFMATCH	1.049	89.625	2.65
SOPRA	1.009	23.375	4.675
SSPACE	1.017	23.0	3.075
BESST	1.017	16.5	11.3
INTEGRATED	0.994	23.375	4.3
ORIGINAL	1.0	0.0	1.0

3.4 Relative quality: staph, c=15

Table S5

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.013	64	4.7
ABySS2	BESST-v2	1.002	18	1.4
Bambus2	BESST-v2	1.011	16	2.0
Allpaths-LG	BESST-v2	1.006	8	5.9
MSR-CA	BESST-v2	1.004	26	2.5
SGA	BESST-v2	1.04	85	46.2
SOAPdenovo	BESST-v2	1.008	28	1.1
Velvet	BESST-v2	1.018	51	2.7
TOTAL	BESST-v2	8.102	296	66.5
AVERAGE	BESST-v2	1.013	37.0	8.312
ABySS	OPERA	1.002	9	1.0
ABySS2	OPERA	1.0	0	1.0
Bambus2	OPERA	1.003	35	1.0
Allpaths-LG	OPERA	1.0	11	1.0
MSR-CA	OPERA	1.001	26	1.0
SGA	OPERA	1.111	804	1.0
SOAPdenovo	OPERA	1.002	29	1.0
Velvet	OPERA	1.005	38	1.0
TOTAL	OPERA	8.124	952	8.0
AVERAGE	OPERA	1.015	119.0	1.0
ABySS	SCARPA	1.001	28	2.4
ABySS2	SCARPA	1.001	1	1.4
Bambus2	SCARPA	1.006	18	1.9
Allpaths-LG	SCARPA	1.002	5	3.6
MSR-CA	SCARPA	1.003	13	2.4
SGA	SCARPA	1.181	121	1.7
SOAPdenovo	SCARPA	1.005	0	1.0
Velvet	SCARPA	1.012	32	1.8
TOTAL	SCARPA	8.211	218	16.2
AVERAGE	SCARPA	1.026	27.25	2.025
ABySS	SCAFFMATCH	1.076	125	2.2
ABySS2	SCAFFMATCH	1.005	28	1.3
Bambus2	SCAFFMATCH	1.018	29	1.8
Allpaths-LG	SCAFFMATCH	1.005	10	6.7
MSR-CA	SCAFFMATCH	1.007	31	2.9
SGA	SCAFFMATCH	1.381	294	4.2
SOAPdenovo	SCAFFMATCH	1.039	26	1.1
Velvet	SCAFFMATCH	1.049	59	2.0
TOTAL	SCAFFMATCH	8.58	602	22.2
AVERAGE	SCAFFMATCH	1.073	75.25	2.775
ABySS	SOPRA	1.014	32	2.9
ABySS2	SOPRA	1.001	12	1.4
Bambus2	SOPRA	1.009	11	1.6
Allpaths-LG	SOPRA	1.004	2	4.6
MSR-CA	SOPRA	1.003	10	2.3
SGA	SOPRA	1.086	117	3.9
SOAPdenovo	SOPRA	1.006	6	1.1
Velvet	SOPRA	1.011	14	2.2
TOTAL	SOPRA	8.134	204	20.0
AVERAGE	SOPRA	1.017	25.5	2.5
ABySS	SSPACE	1.038	15	2.6
ABySS2	SSPACE	1.004	9	1.7
Bambus2	SSPACE	1.013	15	2.3
Allpaths-LG	SSPACE	1.005	3	7.3
MSR-CA	SSPACE	1.008	23	2.9
SGA	SSPACE	1.134	128	3.7
SOAPdenovo	SSPACE	1.024	7	1.1
Velvet	SSPACE	1.02	27	2.6
TOTAL	SSPACE	8.246	227	24.2
AVERAGE	SSPACE	1.031	28.375	3.025
ABySS	BESST	1.033	131	2.9
ABySS2	BESST	1.003	22	1.4
Bambus2	BESST	1.012	16	2.0
Allpaths-LG	BESST	1.006	8	5.9
MSR-CA	BESST	1.004	26	2.5
SGA	BESST	1.216	466	3.6
SOAPdenovo	BESST	1.016	45	1.1
Velvet	BESST	1.024	67	2.5
TOTAL	BESST	8.314	781	21.9
AVERAGE	BESST	1.039	97.625	2.738
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	8.0	0	8.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.013	37.0	8.312
OPERA	1.015	119.0	1.0
SCARPA	1.026	27.25	2.025
SCAFFMATCH	1.073	75.25	2.775
SOPRA	1.017	25.5	2.5
SSPACE	1.031	28.375	3.025
BESST	1.039	97.625	2.738
ORIGINAL	1.0	0.0	1.0

3.5 Relative quality: staph, c=40

Table S6

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.013	32	4.8
ABySS2	BESST-v2	1.002	18	1.4
Bambus2	BESST-v2	1.01	18	2.0
Allpaths-LG	BESST-v2	1.004	5	3.6
MSR-CA	BESST-v2	1.004	26	2.5
SGA	BESST-v2	1.058	127	21.1
SOAPdenovo	BESST-v2	1.008	28	1.1
Velvet	BESST-v2	1.02	49	2.7
TOTAL	BESST-v2	8.119	303	39.2
AVERAGE	BESST-v2	1.015	37.875	4.9
ABySS	OPERA	1.003	12	1.0
ABySS2	OPERA	1.0	2	1.0
Bambus2	OPERA	1.02	69	1.0
Allpaths-LG	OPERA	1.009	35	1.0
MSR-CA	OPERA	1.016	64	1.0
SGA	OPERA	1.078	820	1.0
SOAPdenovo	OPERA	1.009	36	1.0
Velvet	OPERA	1.019	81	1.0
TOTAL	OPERA	8.154	1119	8.0
AVERAGE	OPERA	1.019	139.875	1.0
ABySS	SCARPA	1.006	35	3.5
ABySS2	SCARPA	1.002	15	1.3
Bambus2	SCARPA	1.005	12	1.6
Allpaths-LG	SCARPA	1.003	6	4.2
MSR-CA	SCARPA	1.003	14	2.2
SGA	SCARPA	1.167	173	1.3
SOAPdenovo	SCARPA	1.006	5	1.1
Velvet	SCARPA	1.012	13	2.0
TOTAL	SCARPA	8.204	273	17.2
AVERAGE	SCARPA	1.026	34.125	2.15
ABySS	SCAFFMATCH	1.117	121	2.2
ABySS2	SCAFFMATCH	1.006	27	1.3
Bambus2	SCAFFMATCH	1.019	29	1.9
Allpaths-LG	SCAFFMATCH	1.006	10	7.0
MSR-CA	SCAFFMATCH	1.01	34	2.9
SGA	SCAFFMATCH	1.455	399	4.0
SOAPdenovo	SCAFFMATCH	1.043	45	1.1
Velvet	SCAFFMATCH	1.059	53	2.2
TOTAL	SCAFFMATCH	8.715	718	22.6
AVERAGE	SCAFFMATCH	1.089	89.75	2.825
ABySS	SOPRA	1.012	18	3.2
ABySS2	SOPRA	1.003	13	1.3
Bambus2	SOPRA	1.008	10	1.6
Allpaths-LG	SOPRA	1.003	2	4.6
MSR-CA	SOPRA	1.003	10	1.6
SGA	SOPRA	1.079	88	2.0
SOAPdenovo	SOPRA	1.004	5	1.1
Velvet	SOPRA	1.012	10	2.1
TOTAL	SOPRA	8.124	156	17.5
AVERAGE	SOPRA	1.016	19.5	2.188
ABySS	SSPACE	1.052	16	2.3
ABySS2	SSPACE	1.006	6	1.6
Bambus2	SSPACE	1.013	17	2.1
Allpaths-LG	SSPACE	1.006	4	7.4
MSR-CA	SSPACE	1.009	22	2.9
SGA	SSPACE	1.195	133	3.5
SOAPdenovo	SSPACE	1.023	4	1.1
Velvet	SSPACE	1.022	23	2.4
TOTAL	SSPACE	8.326	225	23.3
AVERAGE	SSPACE	1.041	28.125	2.913
ABySS	BESST	1.033	97	2.8
ABySS2	BESST	1.004	24	1.3
Bambus2	BESST	1.011	19	2.0
Allpaths-LG	BESST	1.006	9	3.3
MSR-CA	BESST	1.004	26	2.5
SGA	BESST	1.221	502	2.7
SOAPdenovo	BESST	1.011	41	1.1
Velvet	BESST	1.029	72	2.4
TOTAL	BESST	8.319	790	18.1
AVERAGE	BESST	1.04	98.75	2.262
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	8.0	0.0	8.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.015	37.875	4.9
OPERA	1.019	139.875	1.0
SCARPA	1.026	34.125	2.15
SCAFFMATCH	1.089	89.75	2.825
SOPRA	1.016	19.5	2.188
SSPACE	1.041	28.125	2.913
BESST	1.04	98.75	2.262
ORIGINAL	1.0	0.0	1.0

3.6 Relative quality: rhodo, c=0

Table S7

assembly	tool	size-diff	misassm	EA_S/EA_C
ABySS	BESST-v2	1.116	147	4.3
ABySS2	BESST-v2	1.017	10	11.0
Bambus2	BESST-v2	1.007	15	1.1
Allpaths-LG	BESST-v2	1.004	7	12.4
CABOG	BESST-v2	1.008	6	15.4
MSR-CA	BESST-v2	1.005	10	11.0
SGA	BESST-v2	1.111	117	3.8
SOAPdenovo	BESST-v2	1.002	6	1.5
Velvet	BESST-v2	1.013	12	13.6
TOTAL	BESST-v2	9.283	330	74.1
AVERAGE	BESST-v2	1.031	36.667	8.233
ABySS	OPERA	1.044	379	1.2
ABySS2	OPERA	1.005	107	1.6
Bambus2	OPERA	1.004	38	1.0
Allpaths-LG	OPERA	1.001	36	2.7
CABOG	OPERA	1.003	38	4.0
MSR-CA	OPERA	1.003	31	3.6
SGA	OPERA	1.065	619	1.7
SOAPdenovo	OPERA	1.002	10	1.3
Velvet	OPERA	1.004	60	3.6
TOTAL	OPERA	9.131	1318	20.7
AVERAGE	OPERA	1.015	146.444	2.3
ABySS	SCARPA	1.07	138	1.4
ABySS2	SCARPA	1.009	44	1.7
Bambus2	SCARPA	1.008	12	1.1
Allpaths-LG	SCARPA	1.002	13	2.1
CABOG	SCARPA	1.003	13	1.9
MSR-CA	SCARPA	1.005	13	1.9
SGA	SCARPA	1.141	155	1.6
SOAPdenovo	SCARPA	1.003	15	1.2
Velvet	SCARPA	1.002	4	1.0
TOTAL	SCARPA	9.243	407	13.9
AVERAGE	SCARPA	1.027	45.222	1.544
ABySS	SCAFFMATCH	1.269	486	1.9
ABySS2	SCAFFMATCH	1.026	95	4.0
Bambus2	SCAFFMATCH	1.028	72	1.1
Allpaths-LG	SCAFFMATCH	1.006	23	7.5
CABOG	SCAFFMATCH	1.01	29	9.9
MSR-CA	SCAFFMATCH	1.011	34	7.7
SGA	SCAFFMATCH	1.583	750	2.2
SOAPdenovo	SCAFFMATCH	1.01	40	1.4
Velvet	SCAFFMATCH	1.044	152	7.4
TOTAL	SCAFFMATCH	9.987	1681	43.1
AVERAGE	SCAFFMATCH	1.11	186.778	4.789
ABySS	SOPRA	1.036	62	1.3
ABySS2	SOPRA	1.006	22	1.6
Bambus2	SOPRA	1.009	16	1.1
Allpaths-LG	SOPRA	1.002	9	1.9
CABOG	SOPRA	1.003	14	1.8
MSR-CA	SOPRA	1.004	12	1.7
SGA	SOPRA	1.09	106	1.7
SOAPdenovo	SOPRA	1.003	11	1.2
Velvet	SOPRA	1.012	24	1.9
TOTAL	SOPRA	9.165	276	14.2
AVERAGE	SOPRA	1.018	30.667	1.578
ABySS	SSPACE	1.039	59	1.4
ABySS2	SSPACE	1.005	17	1.4
Bambus2	SSPACE	1.009	12	1.1
Allpaths-LG	SSPACE	1.003	11	1.6
CABOG	SSPACE	1.002	13	1.5
MSR-CA	SSPACE	1.004	9	1.6
SGA	SSPACE	1.078	79	1.8
SOAPdenovo	SSPACE	1.004	8	1.1
Velvet	SSPACE	1.012	19	1.6
TOTAL	SSPACE	9.156	227	13.1
AVERAGE	SSPACE	1.017	25.222	1.456
ABySS	BESST	1.145	196	3.3
ABySS2	BESST	1.017	12	10.9
Bambus2	BESST	1.007	15	1.1
Allpaths-LG	BESST	1.004	7	12.4
CABOG	BESST	1.008	6	15.4
MSR-CA	BESST	1.007	11	10.9
SGA	BESST	1.151	184	3.0
SOAPdenovo	BESST	1.003	7	1.5
Velvet	BESST	1.014	13	13.6
TOTAL	BESST	9.356	451	72.1
AVERAGE	BESST	1.04	50.111	8.011
ABySS	INTEGRATED	1.023	16	1.4
ABySS2	INTEGRATED	1.012	8	2.2
Bambus2	INTEGRATED	1.013	66	1.0
Allpaths-LG	INTEGRATED	1.005	8	12.0
CABOG	INTEGRATED	1.005	16	7.4
MSR-CA	INTEGRATED	1.007	23	14.2
SGA	INTEGRATED	1.211	165	4.5
SOAPdenovo	INTEGRATED	1.002	22	1.1
Velvet	INTEGRATED	1.019	94	4.5
TOTAL	INTEGRATED	9.297	418.0	48.3
AVERAGE	INTEGRATED	1.033	46.444	5.367
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0.0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.031	36.667	8.233
OPERA	1.015	146.444	2.3
SCARPA	1.027	45.222	1.544
SCAFFMATCH	1.11	186.778	4.789
SOPRA	1.018	30.667	1.578
SSPACE	1.017	25.222	1.456
BESST	1.04	50.111	8.011
INTEGRATED	1.033	46.444	5.367
ORIGINAL	1.0	0.0	1.0

3.7 Relative quality: rhodo, c=15

Table S8

assembly	tool	size-diff	misassm	EA_S/EA_C
ABySS	BESST-v2	1.089	314	4.2
ABySS2	BESST-v2	1.01	19	9.9
Bambus2	BESST-v2	1.007	18	1.1
Allpaths-LG	BESST-v2	1.004	8	11.8
CABOG	BESST-v2	1.006	6	15.2
MSR-CA	BESST-v2	1.004	13	11.0
SGA	BESST-v2	1.079	210	3.1
SOAPdenovo	BESST-v2	1.003	10	1.5
Velvet	BESST-v2	1.012	21	12.9
TOTAL	BESST-v2	9.214	619	70.7
AVERAGE	BESST-v2	1.024	68.778	7.856
ABySS	OPERA	1.015	443	1.0
ABySS2	OPERA	1.005	63	1.0
Bambus2	OPERA	1.003	21	1.0
Allpaths-LG	OPERA	1.007	48	1.0
CABOG	OPERA	1.013	93	1.0
MSR-CA	OPERA	1.018	123	1.0
SGA	OPERA	1.031	969	1.0
SOAPdenovo	OPERA	1.001	13	1.0
Velvet	OPERA	1.011	81	1.0
TOTAL	OPERA	9.104	1854	9.0
AVERAGE	OPERA	1.012	206.0	1.0
ABySS	SCARPA	1.166	272	1.2
ABySS2	SCARPA	0.999	11	1.0
Bambus2	SCARPA	1.0	0	1.0
Allpaths-LG	SCARPA	1.0	0	1.0
CABOG	SCARPA	1.0	0	1.0
MSR-CA	SCARPA	1.0	1	1.0
SGA	SCARPA	1.557	322	1.1
SOAPdenovo	SCARPA	1.0	0	1.0
Velvet	SCARPA	1.0	2	1.0
TOTAL	SCARPA	9.722	608	9.3
AVERAGE	SCARPA	1.08	67.556	1.033
ABySS	SCAFFMATCH	1.316	495	1.9
ABySS2	SCAFFMATCH	1.03	105	4.0
Bambus2	SCAFFMATCH	1.028	73	1.1
Allpaths-LG	SCAFFMATCH	1.006	23	7.5
CABOG	SCAFFMATCH	1.01	31	9.8
MSR-CA	SCAFFMATCH	1.012	36	7.9
SGA	SCAFFMATCH	1.738	694	2.3
SOAPdenovo	SCAFFMATCH	1.014	38	1.4
Velvet	SCAFFMATCH	1.057	143	7.4
TOTAL	SCAFFMATCH	10.211	1638	43.3
AVERAGE	SCAFFMATCH	1.135	182.0	4.811
ABySS	SOPRA	1.115	232	1.2
ABySS2	SOPRA	1.021	24	1.6
Bambus2	SOPRA	1.009	20	1.1
Allpaths-LG	SOPRA	1.002	9	1.8
CABOG	SOPRA	1.003	17	1.8
MSR-CA	SOPRA	1.005	17	1.6
SGA	SOPRA	1.455	439	1.1
SOAPdenovo	SOPRA	1.004	12	1.2
Velvet	SOPRA	1.026	30	1.8
TOTAL	SOPRA	9.64	800	13.2
AVERAGE	SOPRA	1.071	88.889	1.467
ABySS	SSPACE	1.103	193	1.4
ABySS2	SSPACE	1.02	25	1.4
Bambus2	SSPACE	1.012	21	1.1
Allpaths-LG	SSPACE	1.004	12	1.6
CABOG	SSPACE	1.003	17	1.5
MSR-CA	SSPACE	1.006	13	1.6
SGA	SSPACE	1.359	366	1.6
SOAPdenovo	SSPACE	1.009	10	1.1
Velvet	SSPACE	1.023	27	1.6
TOTAL	SSPACE	9.539	684	12.9
AVERAGE	SSPACE	1.06	76.0	1.433
ABySS	BESST	1.272	836	1.7
ABySS2	BESST	1.029	61	7.4
Bambus2	BESST	1.007	18	1.1
Allpaths-LG	BESST	1.006	9	11.4
CABOG	BESST	1.01	13	11.0
MSR-CA	BESST	1.009	23	8.3
SGA	BESST	1.21	547	1.8
SOAPdenovo	BESST	1.006	16	1.5
Velvet	BESST	1.021	38	12.6
TOTAL	BESST	9.57	1561	56.8
AVERAGE	BESST	1.063	173.444	6.311
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.024	68.778	7.856
OPERA	1.012	206.0	1.0
SCARPA	1.08	67.556	1.033
SCAFFMATCH	1.135	182.0	4.811
SOPRA	1.071	88.889	1.467
SSPACE	1.06	76.0	1.433
BESST	1.063	173.444	6.311
ORIGINAL	1.0	0.0	1.0

3.8 Relative quality: rhodo, c=40

Table S9

assembly	tool	size-diff	misassm	EA_S/EA_C
ABySS	BESST-v2	1.061	212	4.6
ABySS2	BESST-v2	1.009	19	10.9
Bambus2	BESST-v2	1.01	21	1.1
Allpaths-LG	BESST-v2	1.004	7	12.4
CABOG	BESST-v2	1.006	7	15.2
MSR-CA	BESST-v2	1.004	12	11.5
SGA	BESST-v2	1.051	105	4.6
SOAPdenovo	BESST-v2	1.003	11	1.5
Velvet	BESST-v2	1.012	19	15.3
TOTAL	BESST-v2	9.16	413	77.1
AVERAGE	BESST-v2	1.018	45.889	8.567
ABySS	OPERA	1.031	914	1.0
ABySS2	OPERA	1.02	365	1.0
Bambus2	OPERA	1.002	53	1.0
Allpaths-LG	OPERA	1.011	155	1.0
CABOG	OPERA	1.014	262	1.0
MSR-CA	OPERA	1.018	309	1.0
SGA	OPERA	1.042	1506	1.0
SOAPdenovo	OPERA	1.003	45	1.0
Velvet	OPERA	1.021	345	1.0
TOTAL	OPERA	9.162	3954	9.0
AVERAGE	OPERA	1.018	439.333	1.0
ABySS	SCARPA	1.287	521	1.1
ABySS2	SCARPA	0.998	28	1.0
Bambus2	SCARPA	1.0	0	1.0
Allpaths-LG	SCARPA	1.002	13	2.1
CABOG	SCARPA	1.0	0	1.0
MSR-CA	SCARPA	1.0	0	1.0
SGA	SCARPA	1.757	468	1.0
SOAPdenovo	SCARPA	1.0	0	1.0
Velvet	SCARPA	0.999	1	1.0
TOTAL	SCARPA	10.043	1031	10.2
AVERAGE	SCARPA	1.116	114.556	1.133
ABySS	SCAFFMATCH	1.487	631	1.9
ABySS2	SCAFFMATCH	1.044	114	3.4
Bambus2	SCAFFMATCH	1.025	61	1.1
Allpaths-LG	SCAFFMATCH	1.007	25	7.5
CABOG	SCAFFMATCH	1.011	31	9.8
MSR-CA	SCAFFMATCH	1.015	50	6.7
SGA	SCAFFMATCH	2.027	661	2.3
SOAPdenovo	SCAFFMATCH	1.021	37	1.5
Velvet	SCAFFMATCH	1.087	166	7.3
TOTAL	SCAFFMATCH	10.724	1776	41.5
AVERAGE	SCAFFMATCH	1.192	197.333	4.611
ABySS	SOPRA	1.231	291	1.1
ABySS2	SOPRA	1.025	31	1.4
Bambus2	SOPRA	1.011	24	1.1
Allpaths-LG	SOPRA	1.002	11	1.8
CABOG	SOPRA	1.003	16	1.8
MSR-CA	SOPRA	1.005	14	1.6
SGA	SOPRA	1.71	298	1.1
SOAPdenovo	SOPRA	1.014	9	1.2
Velvet	SOPRA	1.036	36	1.8
TOTAL	SOPRA	10.037	730	12.9
AVERAGE	SOPRA	1.115	81.111	1.433
ABySS	SSPACE	1.369	584	1.3
ABySS2	SSPACE	1.041	77	1.4
Bambus2	SSPACE	1.013	28	1.1
Allpaths-LG	SSPACE	1.006	16	1.5
CABOG	SSPACE	1.004	23	1.5
MSR-CA	SSPACE	1.011	25	1.6
SGA	SSPACE	1.978	574	1.4
SOAPdenovo	SSPACE	1.026	20	1.1
Velvet	SSPACE	1.052	51	1.6
TOTAL	SSPACE	10.5	1398	12.5
AVERAGE	SSPACE	1.167	155.333	1.389
ABySS	BESST	1.265	866	1.6
ABySS2	BESST	1.034	94	6.2
Bambus2	BESST	1.01	23	1.1
Allpaths-LG	BESST	1.006	9	11.4
CABOG	BESST	1.009	15	11.0
MSR-CA	BESST	1.009	32	8.0
SGA	BESST	1.196	514	1.7
SOAPdenovo	BESST	1.008	20	1.5
Velvet	BESST	1.023	51	11.8
TOTAL	BESST	9.56	1624	54.3
AVERAGE	BESST	1.062	180.444	6.033
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.018	45.889	8.567
OPERA	1.018	439.333	1.0
SCARPA	1.116	114.556	1.133
SCAFFMATCH	1.192	197.333	4.611
SOPRA	1.115	81.111	1.433
SSPACE	1.167	155.333	1.389
BESST	1.062	180.444	6.033
ORIGINAL	1.0	0.0	1.0

3.9 Relative quality: rhodo_wide_N100

Table S10

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.035	337	1.2
ABySS2	BESST-v2	1.013	176	1.8
Bambus2	BESST-v2	1.005	46	1.0
Allpaths-LG	BESST-v2	1.003	52	2.5
CABOG	BESST-v2	1.005	74	3.0
MSR-CA	BESST-v2	1.007	92	2.3
SGA	BESST-v2	1.002	17	1.0
SOAPdenovo	BESST-v2	1.003	23	1.3
Velvet	BESST-v2	1.009	103	3.3
TOTAL	BESST-v2	9.082	920.0	17.4
AVERAGE	BESST-v2	1.009	102.222	1.933
ABySS	OPERA	1.011	424	1.2
ABySS2	OPERA	1.001	98	1.7
Bambus2	OPERA	1.002	48	1.0
Allpaths-LG	OPERA	1.0	39	2.5
CABOG	OPERA	1.001	38	2.9
MSR-CA	OPERA	1.001	38	3.3
SGA	OPERA	1.02	671	1.7
SOAPdenovo	OPERA	1.001	21	1.1
Velvet	OPERA	1.002	55	2.7
TOTAL	OPERA	9.039	1432.0	18.1
AVERAGE	OPERA	1.004	159.111	2.011
ABySS	SCARPA	1.014	185	1.2
ABySS2	SCARPA	1.005	116	1.5
Bambus2	SCARPA	1.004	52	1.0
Allpaths-LG	SCARPA	1.001	35	1.7
CABOG	SCARPA	1.001	34	2.1
MSR-CA	SCARPA	1.003	43	1.9
SGA	SCARPA	1.049	325	1.3
SOAPdenovo	SCARPA	1.0	13	1.1
Velvet	SCARPA	1.009	45	1.3
TOTAL	SCARPA	9.086	848.0	13.1
AVERAGE	SCARPA	1.01	94.222	1.456
ABySS	SCAFFMATCH	1.09	908	1.4
ABySS2	SCAFFMATCH	1.008	190	2.0
Bambus2	SCAFFMATCH	1.007	110	1.0
Allpaths-LG	SCAFFMATCH	1.001	63	3.0
CABOG	SCAFFMATCH	1.002	65	5.3
MSR-CA	SCAFFMATCH	1.004	73	4.0
SGA	SCAFFMATCH	1.195	1510	1.6
SOAPdenovo	SCAFFMATCH	1.004	66	1.2
Velvet	SCAFFMATCH	1.016	209	4.4
TOTAL	SCAFFMATCH	9.327	3194.0	23.9
AVERAGE	SCAFFMATCH	1.036	354.889	2.656
ABySS	SOPRA	1.01	97	1.1
ABySS2	SOPRA	1.001	19	1.0
Bambus2	SOPRA	1.001	16	1.0
Allpaths-LG	SOPRA	1.001	10	1.0
CABOG	SOPRA	1.0	5	1.1
MSR-CA	SOPRA	1.001	11	1.1
SGA	SOPRA	1.026	204	1.1
SOAPdenovo	SOPRA	1.001	7	1.0
Velvet	SOPRA	1.002	24	1.1
TOTAL	SOPRA	9.043	393.0	9.5
AVERAGE	SOPRA	1.005	43.667	1.056
ABySS	SSPACE	1.009	116	1.2
ABySS2	SSPACE	1.002	40	1.2
Bambus2	SSPACE	1.004	43	1.0
Allpaths-LG	SSPACE	1.002	31	1.3
CABOG	SSPACE	1.0	19	1.3
MSR-CA	SSPACE	1.003	35	1.3
SGA	SSPACE	1.027	203	1.3
SOAPdenovo	SSPACE	1.003	24	1.1
Velvet	SSPACE	1.005	62	1.4
TOTAL	SSPACE	9.055	573.0	11.1
AVERAGE	SSPACE	1.006	63.667	1.233
ABySS	BESST	1.037	357	1.2
ABySS2	BESST	1.013	178	1.8
Bambus2	BESST	1.005	46	1.0
Allpaths-LG	BESST	1.003	52	2.5
CABOG	BESST	1.005	74	3.0
MSR-CA	BESST	1.007	93	2.3
SGA	BESST	1.002	20	1.0
SOAPdenovo	BESST	1.003	23	1.3
Velvet	BESST	1.009	102	3.3
TOTAL	BESST	9.084	945.0	17.4
AVERAGE	BESST	1.009	105.0	1.933
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0.0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.009	102.222	1.933
OPERA	1.004	159.111	2.011
SCARPA	1.01	94.222	1.456
SCAFFMATCH	1.036	354.889	2.656
SOPRA	1.005	43.667	1.056
SSPACE	1.006	63.667	1.233
BESST	1.009	105.0	1.933
ORIGINAL	1.0	0.0	1.0

3.10 Relative quality: rhodo_wide_N1000

Table S11

assembly	tool	size-diff	misassm	EA_S/EA_C
ABySS	BESST-v2	1.035	96	2.4
ABySS2	BESST-v2	1.013	20	10.4
Bambus2	BESST-v2	1.005	12	4.4
Allpaths-LG	BESST-v2	1.003	8	8.7
CABOG	BESST-v2	1.005	18	7.7
MSR-CA	BESST-v2	1.007	17	7.9
SGA	BESST-v2	1.002	8	1.1
SOAPdenovo	BESST-v2	1.003	9	3.2
Velvet	BESST-v2	1.009	26	11.4
TOTAL	BESST-v2	9.082	214.0	57.2
AVERAGE	BESST-v2	1.009	23.778	6.356
ABySS	OPERA	1.011	160	1.8
ABySS2	OPERA	1.001	17	2.6
Bambus2	OPERA	1.002	13	2.3
Allpaths-LG	OPERA	1.0	7	5.5
CABOG	OPERA	1.001	9	3.3
MSR-CA	OPERA	1.001	8	5.4
SGA	OPERA	1.02	243	3.4
SOAPdenovo	OPERA	1.001	7	4.0
Velvet	OPERA	1.002	11	3.6
TOTAL	OPERA	9.039	475.0	31.9
AVERAGE	OPERA	1.004	52.778	3.544
ABySS	SCARPA	1.014	66	1.3
ABySS2	SCARPA	1.005	33	2.1
Bambus2	SCARPA	1.004	15	1.5
Allpaths-LG	SCARPA	1.001	3	2.6
CABOG	SCARPA	1.001	6	2.9
MSR-CA	SCARPA	1.003	10	2.4
SGA	SCARPA	1.049	93	1.7
SOAPdenovo	SCARPA	1.0	3	1.6
Velvet	SCARPA	1.009	15	1.5
TOTAL	SCARPA	9.086	244.0	17.6
AVERAGE	SCARPA	1.01	27.111	1.956
ABySS	SCAFFMATCH	1.09	383	2.4
ABySS2	SCAFFMATCH	1.008	51	8.5
Bambus2	SCAFFMATCH	1.007	33	3.4
Allpaths-LG	SCAFFMATCH	1.001	11	12.9
CABOG	SCAFFMATCH	1.002	16	11.1
MSR-CA	SCAFFMATCH	1.004	31	9.0
SGA	SCAFFMATCH	1.195	679	3.4
SOAPdenovo	SCAFFMATCH	1.004	32	5.3
Velvet	SCAFFMATCH	1.016	108	10.5
TOTAL	SCAFFMATCH	9.327	1344.0	66.5
AVERAGE	SCAFFMATCH	1.036	149.333	7.389
ABySS	SOPRA	1.01	14	1.1
ABySS2	SOPRA	1.001	1	1.1
Bambus2	SOPRA	1.001	5	1.1
Allpaths-LG	SOPRA	1.001	3	1.1
CABOG	SOPRA	1.0	1	1.1
MSR-CA	SOPRA	1.001	3	1.1
SGA	SOPRA	1.026	48	1.3
SOAPdenovo	SOPRA	1.001	0	1.2
Velvet	SOPRA	1.002	5	1.1
TOTAL	SOPRA	9.043	80.0	10.2
AVERAGE	SOPRA	1.005	8.889	1.133
ABySS	SSPACE	1.009	24	1.4
ABySS2	SSPACE	1.002	3	1.3
Bambus2	SSPACE	1.004	13	1.4
Allpaths-LG	SSPACE	1.002	5	1.6
CABOG	SSPACE	1.0	2	1.5
MSR-CA	SSPACE	1.003	9	1.6
SGA	SSPACE	1.027	39	1.8
SOAPdenovo	SSPACE	1.003	4	1.4
Velvet	SSPACE	1.005	16	1.6
TOTAL	SSPACE	9.055	115.0	13.6
AVERAGE	SSPACE	1.006	12.778	1.511
ABySS	BESST	1.037	120	2.2
ABySS2	BESST	1.013	22	9.9
Bambus2	BESST	1.005	12	4.4
Allpaths-LG	BESST	1.003	8	8.7
CABOG	BESST	1.005	18	7.7
MSR-CA	BESST	1.007	20	7.8
SGA	BESST	1.002	10	1.1
SOAPdenovo	BESST	1.003	9	3.2
Velvet	BESST	1.009	25	11.4
TOTAL	BESST	9.084	244.0	56.4
AVERAGE	BESST	1.009	27.111	6.267
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0.0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.009	23.778	6.356
OPERA	1.004	52.778	3.544
SCARPA	1.01	27.111	1.956
SCAFFMATCH	1.036	149.333	7.389
SOPRA	1.005	8.889	1.133
SSPACE	1.006	12.778	1.511
BESST	1.009	27.111	6.267
ORIGINAL	1.0	0.0	1.0

3.11 Relative quality: hs14, c=0

Table S12

assembly	tool	size-diff	misassm	EA_S/EA_C
ABySS	BESST-v2	1.049	4958	3.0
ABySS2	BESST-v2	1.026	2228	3.6
Bambus2	BESST-v2	1.025	2661	3.5
Allpaths-LG	BESST-v2	1.019	721	3.9
CABOG	BESST-v2	1.005	429	3.7
MSR-CA	BESST-v2	1.029	2410	3.0
SGA	BESST-v2	1.031	3071	7.8
SOAPdenovo	BESST-v2	1.029	4571	1.5
Velvet	BESST-v2	1.055	2961	3.5
TOTAL	BESST-v2	9.268	24 010	33.5
AVERAGE	BESST-v2	1.03	2667.778	3.722
ABySS	OPERA	1.041	6801	1.1
ABySS2	OPERA	1.019	4236	1.5
Bambus2	OPERA	1.018	6183	1.7
Allpaths-LG	OPERA	1.014	2435	1.7
CABOG	OPERA	1.003	737	2.7
MSR-CA	OPERA	1.0	0	1.0
SGA	OPERA	1.003	391	1.0
SOAPdenovo	OPERA	1.025	4384	1.5
Velvet	OPERA	1.091	18 522	1.7
TOTAL	OPERA	9.214	43 689	13.9
AVERAGE	OPERA	1.024	4854.333	1.544
ABySS	SCARPA	1.099	7866	1.7
ABySS2	SCARPA	1.0	41	1.0
Bambus2	SCARPA	1.0	28	1.0
Allpaths-LG	SCARPA	1.0	71	1.0
CABOG	SCARPA	1.0	495	2.8
MSR-CA	SCARPA	1.06	4698	1.9
SGA	SCARPA	1.052	4500	1.5
SOAPdenovo	SCARPA	1.0	39	1.0
Velvet	SCARPA	1.111	9178	2.1
TOTAL	SCARPA	9.322	26 916	14.0
AVERAGE	SCARPA	1.036	2990.667	1.556
ABySS	SCAFFMATCH	1.314	21 044	2.0
ABySS2	SCAFFMATCH	1.053	5053	2.2
Bambus2	SCAFFMATCH	1.036	5465	2.2
Allpaths-LG	SCAFFMATCH	1.017	1462	2.5
CABOG	SCAFFMATCH	1.004	651	2.7
MSR-CA	SCAFFMATCH	1.157	11 103	2.7
SGA	SCAFFMATCH	1.141	18 674	2.2
SOAPdenovo	SCAFFMATCH	1.058	5179	1.6
Velvet	SCAFFMATCH	1.376	15 477	2.8
TOTAL	SCAFFMATCH	10.156	84 108	20.9
AVERAGE	SCAFFMATCH	1.128	9345.333	2.322
ABySS	SOPRA	1.112	15 655	2.1
ABySS2	SOPRA	1.023	3104	2.6
Bambus2	SOPRA	1.018	3263	2.9
Allpaths-LG	SOPRA	1.016	1295	2.5
CABOG	SOPRA	1.003	500	2.9
MSR-CA	SOPRA	1.036	4132	2.0
SGA	SOPRA	1.009	1988	1.4
SOAPdenovo	SOPRA	1.027	2623	1.6
Velvet	SOPRA	1.156	13 485	3.7
TOTAL	SOPRA	9.4	46 045	21.7
AVERAGE	SOPRA	1.044	5116.111	2.411
ABySS	SSPACE	1.136	6332	2.2
ABySS2	SSPACE	1.031	2448	2.3
Bambus2	SSPACE	1.024	2977	3.6
Allpaths-LG	SSPACE	1.017	1408	2.5
CABOG	SSPACE	1.004	514	3.1
MSR-CA	SSPACE	1.082	5782	2.7
SGA	SSPACE	1.067	6303	2.9
SOAPdenovo	SSPACE	1.034	2881	1.6
Velvet	SSPACE	1.171	6818	2.7
TOTAL	SSPACE	9.566	35 463	23.6
AVERAGE	SSPACE	1.063	3940.333	2.622
ABySS	BESST	1.098	10 461	2.0
ABySS2	BESST	1.05	4483	2.9
Bambus2	BESST	1.028	2799	3.4
Allpaths-LG	BESST	1.019	726	3.9
CABOG	BESST	1.005	440	3.7
MSR-CA	BESST	1.036	2719	2.9
SGA	BESST	1.052	6715	4.4
SOAPdenovo	BESST	1.04	5601	1.5
Velvet	BESST	1.083	4688	2.7
TOTAL	BESST	9.411	38 632	27.4
AVERAGE	BESST	1.046	4292.444	3.044
ABySS	INTEGRATED	1.005	197	1.0
ABySS2	INTEGRATED	1.009	393	1.2
Bambus2	INTEGRATED	1.152	11 490	1.0
Allpaths-LG	INTEGRATED	1.038	1411	3.2
CABOG	INTEGRATED	1.003	561	3.1
MSR-CA	INTEGRATED	1.073	11 518	3.8
SGA	INTEGRATED	0.534	4148	7.2
SOAPdenovo	INTEGRATED	1.107	7582	1.0
Velvet	INTEGRATED	1.792	27 844	1.1
TOTAL	INTEGRATED	9.713	65 144.0	22.6
AVERAGE	INTEGRATED	1.079	7238.222	2.511
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.03	2667.778	3.722
OPERA	1.024	4854.333	1.544
SCARPA	1.036	2990.667	1.556
SCAFFMATCH	1.128	9345.333	2.322
SOPRA	1.044	5116.111	2.411
SSPACE	1.063	3940.333	2.622
BESST	1.046	4292.444	3.044
INTEGRATED	1.079	7238.222	2.511
ORIGINAL	1.0	0.0	1.0

3.12 Relative quality: hs14, c=15

Table S13

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.047	5567	3.0
ABySS2	BESST-v2	1.022	2532	3.7
Bambus2	BESST-v2	1.024	2632	3.4
Allpaths-LG	BESST-v2	1.019	723	3.9
CABOG	BESST-v2	1.005	435	3.8
MSR-CA	BESST-v2	1.025	2176	2.8
SGA	BESST-v2	1.028	3917	7.9
SOAPdenovo	BESST-v2	1.03	5151	1.5
Velvet	BESST-v2	1.051	3113	3.2
TOTAL	BESST-v2	9.251	26 246	33.2
AVERAGE	BESST-v2	1.028	2916.222	3.689
ABySS	OPERA	1.004	6235	1.0
ABySS2	OPERA	1.005	4646	1.1
Bambus2	OPERA	1.022	4082	1.0
Allpaths-LG	OPERA	1.002	2570	1.1
CABOG	OPERA	1.001	668	1.2
MSR-CA	OPERA	1.013	10 467	1.0
SGA	OPERA	1.0	288	1.0
SOAPdenovo	OPERA	1.006	4815	1.1
Velvet	OPERA	1.012	16 516	1.0
TOTAL	OPERA	9.065	50 287	9.5
AVERAGE	OPERA	1.007	5587.444	1.056
ABySS	SCARPA	1.117	8421	1.7
ABySS2	SCARPA	1.0	0	1.0
Bambus2	SCARPA	1.014	1668	3.9
Allpaths-LG	SCARPA	1.013	1212	2.3
CABOG	SCARPA	1.0	16	1.0
MSR-CA	SCARPA	1.056	5271	1.9
SGA	SCARPA	1.084	3692	1.3
SOAPdenovo	SCARPA	1.016	1873	1.5
Velvet	SCARPA	1.114	9343	2.1
TOTAL	SCARPA	9.414	31 496	16.7
AVERAGE	SCARPA	1.046	3499.556	1.856
ABySS	SCAFFMATCH	1.328	20 813	2.1
ABySS2	SCAFFMATCH	1.054	5053	2.2
Bambus2	SCAFFMATCH	1.036	5464	2.2
Allpaths-LG	SCAFFMATCH	1.017	1459	2.5
CABOG	SCAFFMATCH	1.004	650	2.8
MSR-CA	SCAFFMATCH	1.158	11 161	2.7
SGA	SCAFFMATCH	1.147	18 584	2.2
SOAPdenovo	SCAFFMATCH	1.06	5212	1.6
Velvet	SCAFFMATCH	1.382	15 499	2.8
TOTAL	SCAFFMATCH	10.186	83 895	21.1
AVERAGE	SCAFFMATCH	1.132	9321.667	2.344
ABySS	SOPRA	1.05	5055	1.7
ABySS2	SOPRA	1.032	4221	2.4
Bambus2	SOPRA	1.019	2958	2.8
Allpaths-LG	SOPRA	1.016	1278	2.5
SGA	SOPRA	1.001	249	1.0
SOAPdenovo	SOPRA	1.032	2988	1.6
Velvet	SOPRA	1.163	13 930	3.4
TOTAL	SOPRA	7.313	30 679	15.4
AVERAGE	SOPRA	1.045	4382.714	2.2
ABySS	SSPACE	1.139	6285	2.2
ABySS2	SSPACE	1.034	2442	2.3
Bambus2	SSPACE	1.024	2964	3.6
Allpaths-LG	SSPACE	1.017	1409	2.5
CABOG	SSPACE	1.004	516	3.0
MSR-CA	SSPACE	1.082	5767	2.7
SGA	SSPACE	1.074	6171	2.8
SOAPdenovo	SSPACE	1.036	2888	1.6
Velvet	SSPACE	1.171	6783	2.7
TOTAL	SSPACE	9.581	35 225	23.4
AVERAGE	SSPACE	1.065	3913.889	2.6
ABySS	BESST	1.133	16 619	1.7
ABySS2	BESST	1.072	7752	2.5
Bambus2	BESST	1.029	2878	3.3
Allpaths-LG	BESST	1.019	741	3.9
CABOG	BESST	1.005	472	3.7
MSR-CA	BESST	1.035	2682	2.6
SGA	BESST	1.074	12 602	3.1
SOAPdenovo	BESST	1.051	7309	1.5
Velvet	BESST	1.093	6039	2.2
TOTAL	BESST	9.511	57 094	24.5
AVERAGE	BESST	1.057	6343.778	2.722
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.028	2916.222	3.689
OPERA	1.007	5587.444	1.056
SCARPA	1.046	3499.556	1.856
SCAFFMATCH	1.132	9321.667	2.344
SOPRA	1.045	4382.714	2.2
SSPACE	1.065	3913.889	2.6
BESST	1.057	6343.778	2.722
ORIGINAL	1.0	0.0	1.0

3.13 Relative quality: hs14, c=40

Table S14

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.027	4096	2.5
ABySS2	BESST-v2	1.019	2499	3.6
Bambus2	BESST-v2	1.019	2034	2.9
Allpaths-LG	BESST-v2	1.019	729	3.9
CABOG	BESST-v2	1.005	450	3.7
MSR-CA	BESST-v2	1.013	1213	2.2
SGA	BESST-v2	1.017	3933	6.8
SOAPdenovo	BESST-v2	1.024	4560	1.5
Velvet	BESST-v2	1.024	1525	2.5
TOTAL	BESST-v2	9.167	21 039	29.6
AVERAGE	BESST-v2	1.019	2337.667	3.289
ABySS	OPERA	1.005	6576	1.0
ABySS2	OPERA	1.028	7998	1.0
Bambus2	OPERA	1.046	9028	1.0
Allpaths-LG	OPERA	1.009	1650	1.0
CABOG	OPERA	1.015	2039	1.0
MSR-CA	OPERA	1.035	14 991	1.0
SGA	OPERA	1.0	115	1.0
SOAPdenovo	OPERA	1.025	7338	1.0
Velvet	OPERA	1.026	18 007	1.0
TOTAL	OPERA	9.189	67 742	9.0
AVERAGE	OPERA	1.021	7526.889	1.0
ABySS	SCARPA	1.17	10 096	1.5
ABySS2	SCARPA	1.001	895	1.8
Bambus2	SCARPA	1.002	550	2.4
Allpaths-LG	SCARPA	1.003	543	1.8
CABOG	SCARPA	0.998	269	2.3
SGA	SCARPA	1.052	4287	1.4
SOAPdenovo	SCARPA	0.999	1115	1.4
Velvet	SCARPA	1.139	10 167	2.0
TOTAL	SCARPA	8.364	27 922	14.6
AVERAGE	SCARPA	1.046	3490.25	1.825
ABySS	SCAFFMATCH	1.485	20 318	2.0
ABySS2	SCAFFMATCH	1.069	5533	2.2
Bambus2	SCAFFMATCH	1.038	5523	2.2
Allpaths-LG	SCAFFMATCH	1.018	1493	2.5
CABOG	SCAFFMATCH	1.005	651	2.8
MSR-CA	SCAFFMATCH	1.188	11 618	2.7
SGA	SCAFFMATCH	1.215	19 591	2.2
SOAPdenovo	SCAFFMATCH	1.087	5785	1.6
Velvet	SCAFFMATCH	2.478	16 677	3.7
TOTAL	SCAFFMATCH	11.583	87 189	21.9
AVERAGE	SCAFFMATCH	1.287	9687.667	2.433
ABySS	SOPRA	1.0	9	1.0
ABySS2	SOPRA	1.054	4793	2.0
Bambus2	SOPRA	1.019	2234	2.2
Allpaths-LG	SOPRA	1.015	1320	2.4
CABOG	SOPRA	1.003	518	2.8
SGA	SOPRA	1.0	0	1.0
SOAPdenovo	SOPRA	1.0	4	1.0
Velvet	SOPRA	1.0	0	1.0
TOTAL	SOPRA	8.091	8878	13.4
AVERAGE	SOPRA	1.011	1109.75	1.675
ABySS	SSPACE	1.219	5833	2.0
ABySS2	SSPACE	1.071	2413	2.2
Bambus2	SSPACE	1.023	2847	3.5
Allpaths-LG	SSPACE	1.017	1406	2.5
CABOG	SSPACE	1.004	513	3.0
MSR-CA	SSPACE	1.086	5474	2.6
SGA	SSPACE	1.16	5077	2.3
SOAPdenovo	SSPACE	1.068	2942	1.6
Velvet	SSPACE	1.192	6352	2.5
TOTAL	SSPACE	9.84	32 857	22.2
AVERAGE	SSPACE	1.093	3650.778	2.467
ABySS	BESST	1.101	12 292	1.5
ABySS2	BESST	1.079	8954	2.3
Bambus2	BESST	1.024	2298	2.8
Allpaths-LG	BESST	1.02	758	3.9
CABOG	BESST	1.006	516	3.6
MSR-CA	BESST	1.02	1642	2.1
SGA	BESST	1.092	17 249	2.4
SOAPdenovo	BESST	1.047	6800	1.4
Velvet	BESST	1.053	3633	1.8
TOTAL	BESST	9.442	54 142	21.8
AVERAGE	BESST	1.049	6015.778	2.422
ABySS	ORIGINAL	1.0	0	1.0
ABySS2	ORIGINAL	1.0	0	1.0
Bambus2	ORIGINAL	1.0	0	1.0
Allpaths-LG	ORIGINAL	1.0	0	1.0
CABOG	ORIGINAL	1.0	0	1.0
MSR-CA	ORIGINAL	1.0	0	1.0
SGA	ORIGINAL	1.0	0	1.0
SOAPdenovo	ORIGINAL	1.0	0	1.0
Velvet	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	9.0	0	9.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.019	2337.667	3.289
OPERA	1.021	7526.889	1.0
SCARPA	1.046	3490.25	1.825
SCAFFMATCH	1.287	9687.667	2.433
SOPRA	1.011	1109.75	1.675
SSPACE	1.093	3650.778	2.467
BESST	1.049	6015.778	2.422
ORIGINAL	1.0	0.0	1.0

3.14 Relative quality: ecoli_wide, N=100

Table S15

assembly	tool	size-diff	misassm	EA_s/EA_c
minia-short-contigs	BESST-v2	1.018	125	3.5
minia-short-contigs-multik	BESST-v2	1.013	75	1.9
velvet-short-scaffolds	BESST-v2	1.016	66	1.3
spades-all-contigs	BESST-v2	1.004	34	1.1
spades-all-scaffolds	BESST-v2	1.004	15	1.1
spades-short-contigs	BESST-v2	1.012	52	1.3
spades-short-scaffolds	BESST-v2	1.012	50	1.2
TOTAL	BESST-v2	7.079	417	11.4
AVERAGE	BESST-v2	1.011	59.571	1.629
minia-short-contigs	OPERA	1.003	72	2.6
minia-short-contigs-multik	OPERA	1.002	47	1.9
velvet-short-scaffolds	OPERA	1.003	58	1.1
spades-all-contigs	OPERA	1.0	12	1.1
spades-all-scaffolds	OPERA	1.001	2	1.0
spades-short-contigs	OPERA	1.0	3	1.1
spades-short-scaffolds	OPERA	1.0	4	1.1
TOTAL	OPERA	7.009	198	9.9
AVERAGE	OPERA	1.001	28.286	1.414
minia-short-contigs	SCARPA	1.003	24	1.1
minia-short-contigs-multik	SCARPA	1.002	17	1.1
velvet-short-scaffolds	SCARPA	1.003	19	1.0
spades-all-contigs	SCARPA	1.001	4	1.0
spades-all-scaffolds	SCARPA	1.0	1	1.0
spades-short-contigs	SCARPA	1.001	15	1.0
spades-short-scaffolds	SCARPA	1.001	15	1.0
TOTAL	SCARPA	7.011	95	7.2
AVERAGE	SCARPA	1.002	13.571	1.029
minia-short-contigs	SCAFFMATCH	1.011	159	3.0
minia-short-contigs-multik	SCAFFMATCH	1.007	102	1.8
velvet-short-scaffolds	SCAFFMATCH	1.006	86	1.1
spades-all-contigs	SCAFFMATCH	1.002	39	1.1
spades-all-scaffolds	SCAFFMATCH	1.002	23	1.0
spades-short-contigs	SCAFFMATCH	1.005	71	1.1
spades-short-scaffolds	SCAFFMATCH	1.005	72	1.1
TOTAL	SCAFFMATCH	7.038	552	10.2
AVERAGE	SCAFFMATCH	1.005	78.857	1.457
minia-short-contigs	SOPRA	1.0	3	1.0
minia-short-contigs-multik	SOPRA	1.0	0	1.0
velvet-short-scaffolds	SOPRA	1.0	1	1.0
spades-all-contigs	SOPRA	1.0	0	1.0
spades-all-scaffolds	SOPRA	1.0	0	1.0
spades-short-contigs	SOPRA	1.0	0	1.0
spades-short-scaffolds	SOPRA	1.0	0	1.0
TOTAL	SOPRA	7.0	4	7.0
AVERAGE	SOPRA	1.0	0.571	1.0
minia-short-contigs	SSPACE	1.0	1	1.0
minia-short-contigs-multik	SSPACE	1.0	0	1.0
velvet-short-scaffolds	SSPACE	1.0	0	1.0
spades-all-contigs	SSPACE	1.0	0	1.0
spades-all-scaffolds	SSPACE	1.0	0	1.0
spades-short-contigs	SSPACE	1.0	0	1.0
spades-short-scaffolds	SSPACE	1.0	0	1.0
TOTAL	SSPACE	7.0	1	7.0
AVERAGE	SSPACE	1.0	0.143	1.0
minia-short-contigs	BESST	1.02	139	3.4
minia-short-contigs-multik	BESST	1.013	83	1.9
velvet-short-scaffolds	BESST	1.016	69	1.3
spades-all-contigs	BESST	1.004	34	1.1
spades-all-scaffolds	BESST	1.004	15	1.1
spades-short-contigs	BESST	1.012	58	1.2
spades-short-scaffolds	BESST	1.012	56	1.2
TOTAL	BESST	7.081	454	11.2
AVERAGE	BESST	1.012	64.857	1.6
minia-short-contigs	ORIGINAL	1.0	0	1.0
minia-short-contigs-multik	ORIGINAL	1.0	0	1.0
velvet-short-scaffolds	ORIGINAL	1.0	0	1.0
spades-all-contigs	ORIGINAL	1.0	0	1.0
spades-all-scaffolds	ORIGINAL	1.0	0	1.0
spades-short-contigs	ORIGINAL	1.0	0	1.0
spades-short-scaffolds	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	7.0	0	7.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.011	59.571	1.629
OPERA	1.001	28.286	1.414
SCARPA	1.002	13.571	1.029
SCAFFMATCH	1.005	78.857	1.457
SOPRA	1.0	0.571	1.0
SSPACE	1.0	0.143	1.0
BESST	1.012	64.857	1.6
ORIGINAL	1.0	0.0	1.0

3.15 Relative quality: ecoli_wide, N=1000

Table S16

assembly	tool	size-diff	misassm	EA_s/EA_c
minia-short-contigs	BESST-v2	1.018	25	16.2
minia-short-contigs-multik	BESST-v2	1.013	13	8.1
velvet-short-scaffolds	BESST-v2	1.016	14	3.4
spades-all-contigs	BESST-v2	1.004	15	1.8
spades-all-scaffolds	BESST-v2	1.004	6	1.1
spades-short-contigs	BESST-v2	1.012	12	3.4
spades-short-scaffolds	BESST-v2	1.012	12	3.1
TOTAL	BESST-v2	7.079	97	37.1
AVERAGE	BESST-v2	1.011	13.857	5.3
minia-short-contigs	OPERA	1.003	11	5.5
minia-short-contigs-multik	OPERA	1.002	14	3.6
velvet-short-scaffolds	OPERA	1.003	21	1.9
spades-all-contigs	OPERA	1.0	1	2.3
spades-all-scaffolds	OPERA	1.001	2	1.0
spades-short-contigs	OPERA	1.0	2	1.2
spades-short-scaffolds	OPERA	1.0	3	1.2
TOTAL	OPERA	7.009	54	16.7
AVERAGE	OPERA	1.001	7.714	2.386
minia-short-contigs	SCARPA	1.003	5	1.2
minia-short-contigs-multik	SCARPA	1.002	6	1.2
velvet-short-scaffolds	SCARPA	1.003	5	1.1
spades-all-contigs	SCARPA	1.001	2	1.0
spades-all-scaffolds	SCARPA	1.0	0	1.0
spades-short-contigs	SCARPA	1.001	4	1.1
spades-short-scaffolds	SCARPA	1.001	4	1.1
TOTAL	SCARPA	7.011	26.0	7.7
AVERAGE	SCARPA	1.002	3.714	1.1
minia-short-contigs	SCAFFMATCH	1.011	61	6.7
minia-short-contigs-multik	SCAFFMATCH	1.007	52	2.8
velvet-short-scaffolds	SCAFFMATCH	1.006	43	1.7
spades-all-contigs	SCAFFMATCH	1.002	16	2.8
spades-all-scaffolds	SCAFFMATCH	1.002	12	1.1
spades-short-contigs	SCAFFMATCH	1.005	32	2.1
spades-short-scaffolds	SCAFFMATCH	1.005	34	1.9
TOTAL	SCAFFMATCH	7.038	250	19.1
AVERAGE	SCAFFMATCH	1.005	35.714	2.729
minia-short-contigs	SOPRA	1.0	2	1.0
minia-short-contigs-multik	SOPRA	1.0	0	1.0
velvet-short-scaffolds	SOPRA	1.0	1	1.0
spades-all-contigs	SOPRA	1.0	0	1.0
spades-all-scaffolds	SOPRA	1.0	0	1.0
spades-short-contigs	SOPRA	1.0	0	1.0
spades-short-scaffolds	SOPRA	1.0	0	1.0
TOTAL	SOPRA	7.0	3	7.0
AVERAGE	SOPRA	1.0	0.429	1.0
minia-short-contigs	SSPACE	1.0	0	1.0
minia-short-contigs-multik	SSPACE	1.0	0	1.0
velvet-short-scaffolds	SSPACE	1.0	0	1.0
spades-all-contigs	SSPACE	1.0	0	1.0
spades-all-scaffolds	SSPACE	1.0	0	1.0
spades-short-contigs	SSPACE	1.0	0	1.0
spades-short-scaffolds	SSPACE	1.0	0	1.0
TOTAL	SSPACE	7.0	0	7.0
AVERAGE	SSPACE	1.0	0.0	1.0
minia-short-contigs	BESST	1.02	44	15.1
minia-short-contigs-multik	BESST	1.013	17	6.9
velvet-short-scaffolds	BESST	1.016	20	3.3
spades-all-contigs	BESST	1.004	15	1.8
spades-all-scaffolds	BESST	1.004	6	1.1
spades-short-contigs	BESST	1.012	16	3.2
spades-short-scaffolds	BESST	1.012	16	3.0
TOTAL	BESST	7.081	134	34.4
AVERAGE	BESST	1.012	19.143	4.914
minia-short-contigs	ORIGINAL	1.0	0	1.0
minia-short-contigs-multik	ORIGINAL	1.0	0	1.0
velvet-short-scaffolds	ORIGINAL	1.0	0	1.0
spades-all-contigs	ORIGINAL	1.0	0	1.0
spades-all-scaffolds	ORIGINAL	1.0	0	1.0
spades-short-contigs	ORIGINAL	1.0	0	1.0
spades-short-scaffolds	ORIGINAL	1.0	0	1.0
TOTAL	ORIGINAL	7.0	0	7.0
AVERAGE	ORIGINAL	1.0	0.0	1.0

Summary

tool	size-diff	misassm	EA_s/EA_c
BESST-v2	1.011	13.857	5.3
OPERA	1.001	7.714	2.386
SCARPA	1.002	3.714	1.1
SCAFFMATCH	1.005	35.714	2.729
SOPRA	1.0	0.429	1.0
SSPACE	1.0	0.0	1.0
BESST	1.012	19.143	4.914
ORIGINAL	1.0	0.0	1.0

4 Detailed quality tables

4.1 Quality indicators: sim, c=30

Table S17

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	497422	491422	0	491 422	485 545.6	483 042.2	485 545.6	483 042.2
OPERA	496500	5000	0	5000	3717.5	3691.5	3717.5	3691.5
SCARPA	503950	26798	9	20 266	25 494.6	25 696.0	20 143.0	20 103.6
SCAFFMATCH	1025654	139732	95	6508	79 102.1	162 262.8	9357.2	9299.4
SOPRA	585620	85940	73	6005	83 892.0	98 257.7	7401.3	7357.8
SSPACE	712496	25013	1	15 532	19 404.0	27 650.6	20 376.6	20 263.2
BESST	680270	674270	199	10 501	668 360.4	909 331.1	8823.8	8759.4
ORIGINAL	496500	5000	0	5000	3717.5	3691.5	3717.5	3691.5

4.2 Quality indicators: assemblathon3k, c=20

Table S18

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	121928629	1863446	2174	101 203	2 458 908.1	2 567 838.8	120 234.6	117 956.0
OPERA	121954771	22015	10168	7674	28 513.0	29 127.2	9656.2	9304.8
SCARPA	120381365	5054	383	4548	10 513.2	10 593.0	5632.7	5423.5
SCAFFMATCH	144147195	343902	34131	4574	353 028.1	435 520.3	5583.1	5454.2
SOPRA	131125068	59205	19639	5486	65 917.7	72 784.7	6388.4	6157.7
SSPACE	133321231	61496	26417	4517	83 217.5	93 801.4	5565.3	5383.1
BESST	136615095	2459086	13236	20 734	2 783 700.7	3 270 543.5	25 344.0	24 912.7
ORIGINAL	120105427	4880	7	4510	10 311.1	10 363.6	5582.2	5374.9

4.3 Quality indicators: staph, c=0

Table S19

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	3870195	262004	25	189107	263348.4	332729.1	166399.8	208259.3
ABySS2	BESST-v2	3819870	345845	27	200325	259967.2	341111.7	175261.1	229451.4
Bambus2	BESST-v2	2864845	683398	55	87709	661437.3	652536.1	98174.0	95820.1
Allpaths-LG	BESST-v2	2886511	1133860	6	567298	1003753.5	997611.2	660777.3	653120.9
MSR-CA	BESST-v2	2872382	425441	53	104359	698435.9	690656.1	146081.4	143974.8
SGA	BESST-v2	3739084	572733	17	173863	517122.8	543708.4	345223.1	328722.3
SOAPdenovo	BESST-v2	2937454	1006600	85	79852	850515.2	854627.9	100457.2	100219.7
Velvet	BESST-v2	2895650	1121609	38	142034	946408.7	937371.6	157937.5	154454.7
TOTAL	BESST-v2	25885991	5551490	306	1544547.0	5200989.0	5350352.0	1850311.0	1914023.0
AVERAGE	BESST-v2	3235748.9	693936.2	38.2	193068.4	650123.6	668794.0	231288.9	239252.9
ABySS	OPERA	3851934	30511	15	29198	36613.9	45982.1	35783.5	44737.8
ABySS2	OPERA	3812231	129144	11	106796	138409.4	181134.9	126658.9	165705.7
Bambus2	OPERA	2868386	1068868	60	81140	895269.0	884226.7	90273.1	88107.4
Allpaths-LG	OPERA	2884659	1095269	11	338760	1147989.3	1140232.0	726312.4	718036.2
MSR-CA	OPERA	2877575	1868552	51	136366	1289322.6	1276920.1	168236.1	165767.1
SGA	OPERA	3571697	1090062	23	327104	1141271.8	1129157.7	367767.7	349375.8
SOAPdenovo	OPERA	2941841	1999626	88	78092	1466893.4	1475438.8	96709.8	96463.5
Velvet	OPERA	2904897	889253	31	191175	785782.0	779974.7	173225.3	169271.6
TOTAL	OPERA	25713220	8171285	290	1288631	6901551.0	6913067.0	1784967.0	1797465.0
AVERAGE	OPERA	3214152.5	1021410.6	36.2	161078.9	862693.9	864133.4	223120.9	224683.1
ABySS	SCARPA	3844466	50853	31	48943	54051.0	67884.8	50882.3	63551.1
ABySS2	SCARPA	3814373	138430	25	129144	147862.2	193865.6	133229.3	174341.0
Bambus2	SCARPA	2844248	132630	52	48730	155360.2	152192.0	67296.4	65665.3
Allpaths-LG	SCARPA	2878935	200247	9	195592	288642.7	286151.8	269084.7	265998.9
MSR-CA	SCARPA	2866993	79090	32	77039	83009.8	81908.7	78154.8	76972.6
SGA	SCARPA	3577041	5861	66	5180	9505.5	9495.5	8234.9	7859.5
SOAPdenovo	SCARPA	2931049	288184	77	75376	252279.8	253065.7	89409.8	89267.0
Velvet	SCARPA	2873139	86618	30	58163	179088.7	176031.9	82878.4	81070.4
TOTAL	SCARPA	25630244	981913	322	638167	1169800.0	1220596.0	779171.0	824726.0
AVERAGE	SCARPA	3203780.5	122739.1	40.2	79770.9	146225.0	152574.5	97396.3	103090.7
ABySS	SCAFFMATCH	3972254	226950	143	88736	207976.5	271753.6	73918.7	93089.4
ABySS2	SCAFFMATCH	3824318	345845	30	176128	261316.5	343450.3	169038.3	221419.1
Bambus2	SCAFFMATCH	2884166	1089346	70	75976	1139500.1	1132075.7	82613.9	80657.2
Allpaths-LG	SCAFFMATCH	2887005	1104049	13	612083	1153748.0	1146998.6	745899.1	737428.8
MSR-CA	SCAFFMATCH	2882271	2419981	61	110405	2051079.2	2035311.8	165038.3	162662.4
SGA	SCAFFMATCH	4411134	82037	378	13097	75810.3	98999.1	16090.7	15700.8
SOAPdenovo	SCAFFMATCH	2973810	690902	106	80028	688096.0	701074.7	99344.1	99292.9
Velvet	SCAFFMATCH	2930030	686873	90	97988	676769.6	680491.7	113075.1	110960.0
TOTAL	SCAFFMATCH	26764988	6645983	891	1254441	6254296.0	6410156.0	1465018.0	1521211.0
AVERAGE	SCAFFMATCH	3345623.5	830747.9	111.4	156805.1	781787.0	801269.4	183127.3	190151.3
ABySS	SOPRA	3880646	151193	36	123414	196441.5	249648.9	133452.0	167411.3
ABySS2	SOPRA	3818003	345845	25	219526	217427.0	285228.3	169557.4	222054.8
Bambus2	SOPRA	2854515	184598	51	60521	246295.1	242080.5	70602.0	68901.7
Allpaths-LG	SOPRA	2880534	656051	6	567281	598419.0	593623.7	519047.5	513190.4
MSR-CA	SOPRA	2872637	263625	43	105323	217209.4	214778.8	113610.8	111932.1
SGA	SOPRA	3546000	704113	100	64008	447076.3	450388.5	100505.2	98031.1
SOAPdenovo	SOPRA	2933602	335072	77	79852	469193.5	470780.0	100938.4	100720.2
Velvet	SOPRA	2895242	197443	23	132320	362307.9	358707.6	126207.8	123388.2
TOTAL	SOPRA	25681179	2837940	361	1352245	2754370.0	2865236.0	1333921.0	1405630.0
AVERAGE	SOPRA	3210147.4	354742.5	45.1	169030.6	344296.2	358154.5	166740.1	175703.7
ABySS	SSPACE	3866878	123414	22	109518	111332.1	140507.4	90877.1	113708.8
ABySS2	SSPACE	3818763	345845	17	309714	259517.8	340370.3	217408.6	284588.6
Bambus2	SSPACE	2869847	924399	53	87711	987232.1	975930.4	104251.6	101781.9
Allpaths-LG	SSPACE	2883832	927100	4	567279	1038949.6	1031633.1	825439.9	815862.4
MSR-CA	SSPACE	2873919	1100914	49	136666	1035946.9	1024808.4	168276.9	165818.2
SGA	SSPACE	3756227	27689	95	17171	28935.6	30611.0	19546.8	18618.9
SOAPdenovo	SSPACE	2932586	585647	79	79852	534204.3	535964.2	101775.3	101580.2
Velvet	SSPACE	2895979	328886	39	133097	285643.7	283098.9	149263.6	146052.5
TOTAL	SSPACE	25898031	4363894	358	1441008	4281762.0	4362924.0	1676840.0	1748011.0
AVERAGE	SSPACE	3237253.9	545486.8	44.8	180126.0	535220.3	545365.5	209605.0	218501.4
ABySS	BESST	3870195	262004	25	189107	263348.4	332729.1	166399.8	208259.3
ABySS2	BESST	3819870	345845	27	200325	259967.2	341111.7	175261.1	229451.4
Bambus2	BESST	2864845	683398	55	87709	661437.3	652536.1	98174.0	95820.1
Allpaths-LG	BESST	2886511	1133860	6	567298	1003753.5	997611.2	660777.3	653120.9
MSR-CA	BESST	2872382	425441	53	104359	698435.9	690656.1	146081.4	143974.8
SGA	BESST	3739084	572733	17	173863	517122.8	543708.4	345223.1	328722.3
SOAPdenovo	BESST	2937454	1006600	85	79852	850515.2	854627.9	100457.2	100219.7
Velvet	BESST	2895650	1121609	38	142034	946408.7	937371.6	157937.5	154454.7
TOTAL	BESST	25885991	5551490	306	1544547	5200989.0	5350352.0	1850311.0	1914023.0
AVERAGE	BESST	3235748.9	693936.2	38.2	193068.4	650123.6	668794.0	231288.9	239252.9
ABySS	ORIGINAL	3837303	29198	8	29198	34475.2	43122.4	34267.8	42842.8
ABySS2	ORIGINAL	3812231	129144	11	106796	138409.4	181134.9	126658.9	165705.7
Bambus2	ORIGINAL	2833735	50192	41	35542	70815.0	69096.3	45769.0	44654.5
Allpaths-LG	ORIGINAL	2870776	96740	1	96740	112229.7	110934.6	112222.8	110917.0
MSR-CA	ORIGINAL	2862552	59152	29	51740	61355.8	60448.0	57283.1	56415.6
SGA	ORIGINAL	3448095	4005	1	4005	4981.3	4716.4	4980.7	4715.7
SOAPdenovo	ORIGINAL	2919280	288184	70	75376	252792.8	252300.9	89499.0	89266.1
Velvet	ORIGINAL	2860307	48440	13	46221	61727.3	60323.0	58118.9	56766.5
TOTAL	ORIGINAL	25444279	705055	174	445618	736786.0	782076.0	528800.0	571284.0
AVERAGE	ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	3235748.9	693936.2	38.2	193068.4	650123.6	668794.0	231288.9	239252.9
OPERA	3214152.5	1021410.6	36.2	161078.9	862693.9	864133.4	223120.9	224683.1
SCARPA	3203780.5	122739.1	40.2	79770.9	146225.0	152574.5	97396.3	103090.7
SCAFFMATCH	3345623.5	830747.9	111.4	156805.1	781787.0	801269.4	183127.3	190151.3
SOPRA	3210147.4	354742.5	45.1	169030.6	344296.2	358154.5	166740.1	175703.7
SSPACE	3237253.9	545486.8	44.8	180126.0	535220.3	545365.5	209605.0	218501.4
BESST	3235748.9	693936.2	38.2	193068.4	650123.6	668794.0	231288.9	239252.9
ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

4.4 Quality indicators: staph, c=15

Table S20

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	3888028	271317	72	189107	265640.0	338872.6	161687.6	203087.3
ABySS2	BESST-v2	3821206	345845	29	200325	259835.6	341203.9	175200.9	229457.0
Bambus2	BESST-v2	2864057	683397	57	81242	661572.4	652426.0	90492.1	88315.8
Allpaths-LG	BESST-v2	2888543	1136120	9	567298	1004731.6	999386.2	660172.0	652581.9
MSR-CA	BESST-v2	2875283	429428	55	104359	698905.0	691818.4	145924.7	143817.5
SGA	BESST-v2	3585958	1033513	86	177123	1045943.2	1067509.9	223840.6	217962.3
SOAPdenovo	BESST-v2	2941595	1006704	98	79852	858019.0	864643.3	102681.1	102467.8
Velvet	BESST-v2	2911692	1126835	64	142034	949695.5	947774.9	157489.9	154227.0
TOTAL	BESST-v2	25776362	6033159	470	1541340	5744342.0	5903635.0	1717489.0	1791917.0
AVERAGE	BESST-v2	3222045.2	754144.9	58.8	192667.5	718042.8	737954.4	214686.1	223989.6
ABySS	OPERA	3845124	29198	17	29198	35061.8	43950.6	34267.8	42842.8
ABySS2	OPERA	3812231	129144	11	106796	138409.4	181134.9	126658.9	165705.7
Bambus2	OPERA	2843273	121822	76	35542	119342.3	116837.9	45764.5	44651.3
Allpaths-LG	OPERA	2871989	141545	12	96740	134334.1	132840.1	112294.7	110989.9
MSR-CA	OPERA	2866663	70419	55	51740	79779.1	78711.8	57293.0	56436.0
SGA	OPERA	3830534	29385	805	4012	33105.2	35705.4	4990.7	4725.2
SOAPdenovo	OPERA	2926492	623437	99	75802	584964.7	585279.6	89974.0	89741.4
Velvet	OPERA	2875158	80712	51	46221	80585.3	79164.2	58169.1	56815.1
TOTAL	OPERA	25871464	1225662	1126	446051	1205582.0	1253624.0	529413.0	571907.0
AVERAGE	OPERA	3233933.0	153207.8	140.8	55756.4	150697.7	156703.1	66176.6	71488.4
ABySS	SCARPA	3840364	82860	36	70002	101729.6	127578.0	82262.6	102307.8
ABySS2	SCARPA	3814840	268562	12	200325	200211.2	262219.7	178317.4	233320.4
Bambus2	SCARPA	2849676	330592	59	70662	377390.6	370400.5	87644.9	85462.1
Allpaths-LG	SCARPA	2877729	513150	6	312792	473451.6	469189.6	402535.6	397883.9
MSR-CA	SCARPA	2871537	233476	42	85502	215307.1	212815.7	136839.4	134814.9
SGA	SCARPA	4073595	9277	122	5683	11697.0	13846.4	8438.8	8166.2
SOAPdenovo	SCARPA	2933045	316522	70	75376	282365.3	283293.8	93898.6	93676.2
Velvet	SCARPA	2894488	194864	45	81036	232199.7	230236.0	104163.0	101819.9
TOTAL	SCARPA	26155274	1949303	392	901378	1894352.0	1969580.0	1094100.0	1157451.0
AVERAGE	SCARPA	3269409.2	243662.9	49.0	112672.2	236794.0	246197.5	136762.5	144681.4
ABySS	SCAFFMATCH	4128993	225982	133	88736	205201.2	279531.1	73973.9	93277.0
ABySS2	SCAFFMATCH	3830885	345845	39	176128	265310.5	349337.6	168979.3	221394.1
Bambus2	SCAFFMATCH	2884175	1089355	70	75976	1139503.4	1132082.5	82613.9	80657.2
Allpaths-LG	SCAFFMATCH	2885229	1094332	11	612083	1147139.2	1139726.6	746591.4	738113.2
MSR-CA	SCAFFMATCH	2881918	2419981	60	110405	2051316.0	2035297.4	165040.2	162665.2
SGA	SCAFFMATCH	4761099	148873	295	16755	119260.4	170270.5	20472.4	20001.8
SOAPdenovo	SCAFFMATCH	3033680	1009437	96	79852	951065.6	989087.1	99479.8	99477.9
Velvet	SCAFFMATCH	2999674	1050169	72	99192	860704.4	886475.0	115821.1	113707.1
TOTAL	SCAFFMATCH	27405653	7383974	776	1259127	6739501.0	6981808.0	1472972.0	1529294.0
AVERAGE	SCAFFMATCH	3425706.6	922996.8	97.0	157390.9	842437.6	872726.0	184121.5	191161.7
ABySS	SOPRA	3889427	123414	40	95825	143620.8	182510.8	98791.6	123713.3
ABySS2	SOPRA	3817233	345845	23	219526	218516.4	286562.1	171786.3	224938.1
Bambus2	SOPRA	2859900	178241	52	60521	330086.8	325050.6	71887.7	70154.7
Allpaths-LG	SOPRA	2881404	655885	3	567281	598179.0	593525.6	520505.4	514603.0
MSR-CA	SOPRA	2872552	223956	39	96395	209188.1	206840.6	129426.3	127505.0
SGA	SOPRA	3745240	37753	118	14961	39494.2	41569.9	19153.4	18207.8
SOAPdenovo	SOPRA	2935987	334389	76	76944	437877.5	439672.1	99945.0	99718.4
Velvet	SOPRA	2892657	216532	27	108210	440724.8	435846.3	128040.2	125158.0
TOTAL	SOPRA	25894400	2116015	378	1239663	2417688.0	2511578.0	1239536.0	1303998.0
AVERAGE	SOPRA	3236800.0	264501.9	47.2	154957.9	302211.0	313947.2	154942.0	162999.8
ABySS	SSPACE	3984930	123414	23	96604	104477.2	136440.1	87546.6	109823.7
ABySS2	SSPACE	3828810	345845	20	309714	258841.6	340469.9	217309.1	284534.7
Bambus2	SSPACE	2869298	924731	56	87711	987637.7	976144.6	104091.6	101625.8
Allpaths-LG	SSPACE	2884988	924239	4	567279	979579.1	973070.8	820599.9	811066.2
MSR-CA	SSPACE	2886086	1104907	52	136666	1033967.3	1027375.8	168127.5	165699.5
SGA	SSPACE	3910486	27580	129	14620	26609.1	29743.5	18371.1	17623.8
SOAPdenovo	SSPACE	2989932	585722	77	79852	522941.4	535875.6	101451.1	101428.6
Velvet	SSPACE	2918227	302414	40	133097	301682.7	301512.4	149160.3	146060.7
TOTAL	SSPACE	26272757	4338852	401	1425543	4215736.0	4320633.0	1666657.0	1737863.0
AVERAGE	SSPACE	3284094.6	542356.5	50.1	178192.9	526967.0	540079.1	208332.2	217232.9
ABySS	BESST	3964606	277381	139	109828	266696.2	347254.8	100404.4	126237.0
ABySS2	BESST	3823825	345845	33	200325	259860.8	341471.4	175187.2	229444.2
Bambus2	BESST	2866644	683397	57	81242	661684.8	653126.5	90498.4	88319.9
Allpaths-LG	BESST	2888543	1136120	9	567298	1004731.6	999386.2	660172.0	652581.9
MSR-CA	BESST	2875283	429428	55	104359	698905.0	691818.4	145924.7	143817.5
SGA	BESST	4193740	1749564	467	13426	1307181.9	1607803.8	17289.5	16828.6
SOAPdenovo	BESST	2967001	1014385	115	79852	861958.5	876156.5	100267.3	100207.3
Velvet	BESST	2930353	1133455	80	109557	954222.0	958426.0	143204.9	140304.5
TOTAL	BESST	26509995	6769575	955	1265887	6015241.0	6475444.0	1432948.0	1497741.0
AVERAGE	BESST	3313749.4	846196.9	119.4	158235.9	751905.1	809430.4	179118.5	187217.6
ABySS	ORIGINAL	3837303	29198	8	29198	34475.2	43122.4	34267.8	42842.8
ABySS2	ORIGINAL	3812231	129144	11	106796	138409.4	181134.9	126658.9	165705.7
Bambus2	ORIGINAL	2833735	50192	41	35542	70815.0	69096.3	45769.0	44654.5
Allpaths-LG	ORIGINAL	2870776	96740	1	96740	112229.7	110934.6	112222.8	110917.0
MSR-CA	ORIGINAL	2862552	59152	29	51740	61355.8	60448.0	57283.1	56415.6
SGA	ORIGINAL	3448095	4005	1	4005	4981.3	4716.4	4980.7	4715.7
SOAPdenovo	ORIGINAL	2919280	288184	70	75376	252792.8	252300.9	89499.0	89266.1
Velvet	ORIGINAL	2860307	48440	13	46221	61727.3	60323.0	58118.9	56766.5
TOTAL	ORIGINAL	25444279	705055	174	445618	736786.0	782076.0	528800.0	571284.0
AVERAGE	ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	3222045.2	754144.9	58.8	192667.5	718042.8	737954.4	214686.1	223989.6
OPERA	3233933.0	153207.8	140.8	55756.4	150697.7	156703.1	66176.6	71488.4
SCARPA	3269409.2	243662.9	49.0	112672.2	236794.0	246197.5	136762.5	144681.4
SCAFFMATCH	3425706.6	922996.8	97.0	157390.9	842437.6	872726.0	184121.5	191161.7
SOPRA	3236800.0	264501.9	47.2	154957.9	302211.0	313947.2	154942.0	162999.8
SSPACE	3284094.6	542356.5	50.1	178192.9	526967.0	540079.1	208332.2	217232.9
BESST	3313749.4	846196.9	119.4	158235.9	751905.1	809430.4	179118.5	187217.6
ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

4.5 Quality indicators: staph, c=40

Table S21

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	3885291	271317	40	189107	263238.0	334973.2	165501.2	207498.5
ABySS2	BESST-v2	3820136	345845	29	200325	261548.9	343366.4	175241.0	229507.5
Bambus2	BESST-v2	2863387	683637	59	81242	661587.2	652287.9	90299.7	88128.6
Allpaths-LG	BESST-v2	2883058	761225	6	396957	807195.1	801375.5	401653.8	397017.0
MSR-CA	BESST-v2	2875267	429428	55	104359	698887.8	691797.5	145924.7	143817.5
SGA	BESST-v2	3646541	288150	128	78696	247720.2	257396.6	102747.6	99708.0
SOAPdenovo	BESST-v2	2941701	1006685	98	79852	857627.1	864128.7	102276.9	102150.2
Velvet	BESST-v2	2916867	1124389	62	148622	951500.0	951548.8	153851.8	150711.6
TOTAL	BESST-v2	25832248	4910676	477	1279160	4749304.0	4896875.0	1337497.0	1418539.0
AVERAGE	BESST-v2	3229031.0	613834.5	59.6	159895.0	593663.0	612109.3	167187.1	177317.4
ABySS	OPERA	3846909	29198	20	29198	34823.2	43672.9	34275.3	42842.8
ABySS2	OPERA	3813163	129144	13	106796	138420.9	181194.5	126650.0	165698.7
Bambus2	OPERA	2889352	173163	110	35542	187790.7	186830.7	45767.0	44655.0
Allpaths-LG	OPERA	2897229	445734	36	96740	410890.2	409892.8	113601.4	112280.2
MSR-CA	OPERA	2908663	229463	93	51740	201504.9	201724.4	57209.0	56358.8
SGA	OPERA	3718671	34096	821	4005	37762.8	39273.8	4981.0	4716.0
SOAPdenovo	OPERA	2944807	367904	106	75802	440870.3	443889.0	89476.8	89244.1
Velvet	OPERA	2915340	154748	94	46221	192654.7	191923.9	59346.8	57973.6
TOTAL	OPERA	25934134	1563450	1293	446044	1644718.0	1698402.0	531307.0	573769.0
AVERAGE	OPERA	3241766.8	195431.2	161.6	55755.5	205589.7	212300.2	66413.4	71721.1
ABySS	SCARPA	3861532	223622	43	125049	161294.1	203375.7	122451.8	151826.1
ABySS2	SCARPA	3818275	345845	26	175372	357210.0	468360.3	159093.5	208219.8
Bambus2	SCARPA	2847151	722565	53	56501	437398.6	428846.4	71158.1	69335.0
Allpaths-LG	SCARPA	2880617	587639	7	312792	573909.7	569232.5	468107.9	462652.7
MSR-CA	SCARPA	2869929	186597	43	83138	228317.7	225549.3	123692.1	121870.1
SGA	SCARPA	4023403	8356	174	4586	11429.0	13267.3	6440.0	6186.1
SOAPdenovo	SCARPA	2936124	316522	75	75376	284239.9	285557.4	93983.4	93762.3
Velvet	SCARPA	2893504	139651	26	69914	200759.4	198697.6	117441.0	114672.2
TOTAL	SCARPA	26130535	2530797	447	902728	2254558.0	2392886.0	1162368.0	1228524.0
AVERAGE	SCARPA	3266316.9	316349.6	55.9	112841.0	281819.8	299110.8	145296.0	153565.5
ABySS	SCAFFMATCH	4288047	247630	129	95854	211943.5	300557.6	74235.6	93656.0
ABySS2	SCAFFMATCH	3833814	345845	38	175914	273444.2	360355.6	168917.0	221332.4
Bambus2	SCAFFMATCH	2886572	1087888	70	77680	1141981.6	1135487.5	84623.7	82619.4
Allpaths-LG	SCAFFMATCH	2889237	1094014	11	612083	1145195.5	1139376.6	781415.6	772539.7
MSR-CA	SCAFFMATCH	2890975	2419986	63	110405	2044774.0	2035548.5	165005.9	162659.8
SGA	SCAFFMATCH	5017484	228830	400	16401	196253.8	297900.8	19256.6	18846.7
SOAPdenovo	SCAFFMATCH	3045034	531878	115	79852	764122.0	797746.1	99850.5	99859.0
Velvet	SCAFFMATCH	3028032	890787	66	107916	762296.5	792585.3	125845.9	123546.0
TOTAL	SCAFFMATCH	27879195	6846858	892	1276105	6540011.0	6859558.0	1519151.0	1575059.0
AVERAGE	SCAFFMATCH	3484899.4	855857.2	111.5	159513.1	817501.4	857444.7	189893.8	196882.4
ABySS	SOPRA	3883481	129695	26	96554	149251.9	189291.4	109443.8	136994.8
ABySS2	SOPRA	3823073	200325	24	200325	200470.4	263297.0	168523.5	220671.5
Bambus2	SOPRA	2857720	193831	51	60521	224657.4	221061.0	72318.2	70576.9
Allpaths-LG	SOPRA	2879934	655965	3	567281	554152.1	549560.6	514309.1	508476.2
MSR-CA	SOPRA	2872422	132901	39	82308	138269.5	136711.7	91428.4	90069.1
SGA	SOPRA	3719953	9163	89	5405	15822.1	16487.1	9771.1	9267.3
SOAPdenovo	SOPRA	2929522	334389	75	79852	466427.0	467251.4	100909.0	100668.1
Velvet	SOPRA	2894102	194612	23	109561	371254.9	367254.8	120322.0	117588.3
TOTAL	SOPRA	25860207	1850881	330	1201807	2120305.0	2210915.0	1187025.0	1254312.0
AVERAGE	SOPRA	3232525.9	231360.1	41.2	150225.9	265038.2	276364.4	148378.1	156789.0
ABySS	SSPACE	4037567	113464	24	94654	94122.6	124749.3	78110.7	98080.4
ABySS2	SSPACE	3836830	345845	17	263530	245131.7	323225.5	204318.3	267618.3
Bambus2	SSPACE	2870252	925420	58	87711	987755.7	976585.8	96435.0	94150.5
Allpaths-LG	SSPACE	2886777	924334	5	567279	1036155.7	1029910.1	825181.6	815614.8
MSR-CA	SSPACE	2889496	1105092	51	136666	1032599.1	1027494.2	168079.0	165699.7
SGA	SSPACE	4120983	23426	134	14111	23811.7	28489.5	17332.0	16731.9
SOAPdenovo	SSPACE	2985640	582333	74	79852	522222.7	534325.1	101357.5	101326.0
Velvet	SSPACE	2924455	270039	36	128093	249380.6	249911.5	140515.4	137669.6
TOTAL	SSPACE	26552000	4289953	399	1371896	4191180.0	4294691.0	1631330.0	1696891.0
AVERAGE	SSPACE	3319000.0	536244.1	49.9	171487.0	523897.5	536836.4	203916.2	212111.4
ABySS	BESST	3963501	284446	105	98464	266650.7	346499.6	96939.4	121657.6
ABySS2	BESST	3826447	345845	35	175843	262066.2	344615.4	166693.5	218327.4
Bambus2	BESST	2865817	683637	60	81242	661692.7	652945.7	90296.8	88123.9
Allpaths-LG	BESST	2887699	765927	10	330364	808376.7	803841.0	374459.8	370147.6
MSR-CA	BESST	2875267	429428	55	104359	698887.8	691797.5	145924.7	143817.5
SGA	BESST	4209553	353316	503	9895	307674.3	379361.6	13015.2	12637.4
SOAPdenovo	BESST	2951300	1013758	111	79852	861600.4	870980.9	99965.4	99848.0
Velvet	BESST	2943878	1135880	85	109557	960675.7	969663.4	139932.6	137136.7
TOTAL	BESST	26523462	5012237	964	989576	4827624.0	5059705.0	1127227.0	1191696.0
AVERAGE	BESST	3315432.8	626529.6	120.5	123697.0	603453.1	632463.1	140903.4	148962.0
ABySS	ORIGINAL	3837303	29198	8	29198	34475.2	43122.4	34267.8	42842.8
ABySS2	ORIGINAL	3812231	129144	11	106796	138409.4	181134.9	126658.9	165705.7
Bambus2	ORIGINAL	2833735	50192	41	35542	70815.0	69096.3	45769.0	44654.5
Allpaths-LG	ORIGINAL	2870776	96740	1	96740	112229.7	110934.6	112222.8	110917.0
MSR-CA	ORIGINAL	2862552	59152	29	51740	61355.8	60448.0	57283.1	56415.6
SGA	ORIGINAL	3448095	4005	1	4005	4981.3	4716.4	4980.7	4715.7
SOAPdenovo	ORIGINAL	2919280	288184	70	75376	252792.8	252300.9	89499.0	89266.1
Velvet	ORIGINAL	2860307	48440	13	46221	61727.3	60323.0	58118.9	56766.5
TOTAL	ORIGINAL	25444279	705055	174	445618	736786.0	782076.0	528800.0	571284.0
AVERAGE	ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	3229031.0	613834.5	59.6	159895.0	593663.0	612109.3	167187.1	177317.4
OPERA	3241766.8	195431.2	161.6	55755.5	205589.7	212300.2	66413.4	71721.1
SCARPA	3266316.9	316349.6	55.9	112841.0	281819.8	299110.8	145296.0	153565.5
SCAFFMATCH	3484899.4	855857.2	111.5	159513.1	817501.4	857444.7	189893.8	196882.4
SOPRA	3232525.9	231360.1	41.2	150225.9	265038.2	276364.4	148378.1	156789.0
SSPACE	3319000.0	536244.1	49.9	171487.0	523897.5	536836.4	203916.2	212111.4
BESST	3315432.8	626529.6	120.5	123697.0	603453.1	632463.1	140903.4	148962.0
ORIGINAL	3180534.9	88131.9	21.8	55702.2	92098.3	97759.6	66100.0	71410.5

4.6 Quality indicators: rhodo, c=0

Table S22

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	5632219	222025	233	28709	196240.4	231846.7	34015.2	35856.8
ABySS2	BESST-v2	5356588	565695	29	252970	492218.6	569838.7	228734.5	260782.4
Bambus2	BESST-v2	4401129	2468202	320	16905	1521945.9	1454447.9	20840.1	19777.5
Allpaths-LG	BESST-v2	4608837	2547339	18	670120	1649991.2	1651762.3	541130.6	539381.6
CABOG	BESST-v2	4272983	703268	19	229344	532502.9	494188.2	383298.9	352808.1
MSR-CA	BESST-v2	4489033	525413	35	222750	660570.9	643446.8	264497.5	256346.2
SGA	BESST-v2	5151289	24481	119	3476	86138.1	88259.6	13435.1	12268.3
SOAPdenovo	BESST-v2	4627849	2523391	103	71295	1552523.2	1545050.4	89151.8	88494.4
Velvet	BESST-v2	4586607	652651	21	241974	478401.7	470680.1	252325.3	245448.1
TOTAL	BESST-v2	43126534	10232465	897	1737543	7170533.0	7149521.0	1827429.0	1811163.0
AVERAGE	BESST-v2	4791837.1	1136940.6	99.7	193060.3	796725.9	794391.2	203047.7	201240.4
ABySS	OPERA	5269262	21476	465	7893	21767.5	23901.7	9853.8	10336.8
ABySS2	OPERA	5295171	59863	126	28521	70656.0	80784.4	32853.3	37387.9
Bambus2	OPERA	4388904	302775	343	15043	411109.1	391784.6	18991.1	18024.0
Allpaths-LG	OPERA	4592612	207572	47	105281	293402.5	292671.4	118597.2	118207.9
CABOG	OPERA	4249571	104502	51	57427	154703.0	142773.3	98723.2	90868.0
MSR-CA	OPERA	4477744	130459	56	65193	183759.4	178478.0	86426.7	83739.1
SGA	OPERA	4940335	14991	621	3610	20395.1	19898.1	5977.2	5442.0
SOAPdenovo	OPERA	4625348	1167723	107	64428	814027.8	809612.1	77921.7	77341.9
Velvet	OPERA	4546679	119255	69	54238	133377.6	130062.2	67121.4	65218.2
TOTAL	OPERA	42385626	2128616	1885	401634	2103198.0	2069966.0	516466.0	506566.0
AVERAGE	OPERA	4709514.0	236512.9	209.4	44626.0	233688.7	229996.2	57385.1	56285.1
ABySS	SCARPA	5397024	14648	224	8052	18558.2	20907.7	10980.5	11502.6
ABySS2	SCARPA	5314614	45473	63	32381	42454.1	48719.1	34535.0	39275.6
Bambus2	SCARPA	4407058	139286	317	17020	166617.8	159443.0	21127.5	20043.7
Allpaths-LG	SCARPA	4598939	91440	24	80937	102694.4	102579.6	91675.6	91334.2
CABOG	SCARPA	4249439	41045	26	33280	54782.9	50556.8	46533.9	42818.4
MSR-CA	SCARPA	4486334	40935	38	35884	51931.5	50535.9	44995.7	43586.9
SGA	SCARPA	5289817	5806	157	2891	8560.2	9019.9	5632.6	5137.2
SOAPdenovo	SCARPA	4629771	267463	112	63015	357252.6	355714.9	74537.2	73990.3
Velvet	SCARPA	4536364	16746	13	15670	20604.5	20046.2	19101.0	18548.5
TOTAL	SCARPA	42909360	662842	974	289130	823456.0	817523.0	349119.0	346237.0
AVERAGE	SCARPA	4767706.7	73649.1	108.2	32125.6	91495.1	90835.9	38791.0	38470.8
ABySS	SCAFFMATCH	6404342	54734	572	12843	47150.6	64077.0	14698.0	15625.7
ABySS2	SCAFFMATCH	5407199	294434	114	62165	361773.9	422782.4	83880.7	95564.4
Bambus2	SCAFFMATCH	4493425	2655284	377	17578	1731829.3	1690371.3	20853.2	19800.2
Allpaths-LG	SCAFFMATCH	4616245	3197186	34	347226	2410622.7	2416992.5	328922.1	327860.3
CABOG	SCAFFMATCH	4279892	704725	42	181186	578867.4	538042.0	245571.3	226050.8
MSR-CA	SCAFFMATCH	4512826	2556092	59	146582	1600174.0	1566577.7	185098.6	179363.8
SGA	SCAFFMATCH	7341893	53155	752	5617	42643.4	65014.4	7682.4	7202.7
SOAPdenovo	SCAFFMATCH	4662785	2530806	137	72231	1558733.3	1565057.6	87937.8	87406.4
Velvet	SCAFFMATCH	4728007	526616	161	94734	494780.4	504683.4	136224.2	133124.5
TOTAL	SCAFFMATCH	46446614	12573032	2248	940162	8826575.0	8833598.0	1110868.0	1091999.0
AVERAGE	SCAFFMATCH	5160734.9	1397003.6	249.8	104462.4	980730.6	981510.9	123429.8	121333.2
ABySS	SOPRA	5228266	11400	148	7744	12691.2	13825.0	10358.4	10865.6
ABySS2	SOPRA	5300842	33193	41	27267	36704.2	42010.9	33008.1	37565.8
Bambus2	SOPRA	4411731	122828	321	16944	145148.3	139045.3	20652.6	19597.5
Allpaths-LG	SOPRA	4599390	76488	20	70959	93018.8	92924.0	81258.1	80983.1
CABOG	SOPRA	4249887	35731	27	28365	50225.1	46355.5	44158.7	40634.3
MSR-CA	SOPRA	4483621	39027	37	30482	46042.2	44777.7	40820.4	39540.0
SGA	SOPRA	5055604	6125	108	3009	8964.9	8976.9	5911.1	5382.3
SOAPdenovo	SOPRA	4630455	234440	108	63017	267992.3	266924.3	72658.2	72138.0
Velvet	SOPRA	4582060	35596	33	26135	43645.9	42925.3	35537.2	34548.3
TOTAL	SOPRA	42541856	594828	843	273922	704433.0	697765.0	344363.0	341255.0
AVERAGE	SOPRA	4726872.9	66092.0	93.7	30435.8	78270.3	77529.4	38262.5	37917.2
ABySS	SSPACE	5243172	11606	145	7744	14243.0	15561.4	11304.8	11857.2
ABySS2	SSPACE	5297933	29671	36	27017	31960.6	36561.3	29222.7	33255.9
Bambus2	SSPACE	4411235	122828	317	16914	140260.1	134347.5	20338.8	19298.1
Allpaths-LG	SSPACE	4603443	61818	22	59808	72888.1	72878.0	68128.3	67888.0
CABOG	SSPACE	4246228	33216	26	26771	41517.3	38285.6	37264.8	34286.7
MSR-CA	SSPACE	4484370	35380	34	29621	42901.5	41730.2	38890.5	37667.8
SGA	SSPACE	5000547	5050	81	2760	8834.2	8736.7	6342.6	5771.9
SOAPdenovo	SSPACE	4633091	240636	105	62489	228311.9	227457.5	70414.1	69888.9
Velvet	SSPACE	4584192	28242	28	22916	35147.9	34576.7	30512.5	29655.1
TOTAL	SSPACE	42504211	568447	794	256040	616065.0	610135.0	312419.0	309570.0
AVERAGE	SSPACE	4722690.1	63160.8	88.2	28448.9	68451.6	67792.8	34713.2	34396.6
ABySS	BESST	5777852	242130	282	23414	205801.0	249653.3	26039.2	27447.9
ABySS2	BESST	5360828	565695	31	252970	492222.9	570297.1	227610.4	259503.1
Bambus2	BESST	4401129	2468202	320	16905	1521945.9	1454447.9	20840.1	19777.5
Allpaths-LG	BESST	4608837	2547339	18	670120	1649991.2	1651762.3	541130.6	539381.6
CABOG	BESST	4272983	703268	19	229344	532502.9	494188.2	383298.9	352808.1
MSR-CA	BESST	4497093	525413	36	222750	661309.8	645324.5	263438.8	255326.5
SGA	BESST	5338730	56713	186	3270	98553.7	104994.2	10678.0	9749.4
SOAPdenovo	BESST	4632128	2523391	104	71295	1551506.9	1545481.3	89147.7	88492.4
Velvet	BESST	4590106	652651	22	241974	478250.6	470895.0	252323.1	245445.9
TOTAL	BESST	43479686	10284802	1018	1732042	7192085.0	7187044.0	1814507.0	1797932.0
AVERAGE	BESST	4831076.2	1142755.8	113.1	192449.1	799120.5	798560.4	201611.9	199770.3
ABySS	ORIGINAL	5045660	5872	86	5247	8904.2	9344.6	7978.1	8363.3
ABySS2	ORIGINAL	5269366	19663	19	18731	22038.8	25074.5	20848.9	23719.2
Bambus2	ORIGINAL	4371571	93198	305	15043	99576.4	94520.7	18810.1	17851.5
Allpaths-LG	ORIGINAL	4588376	42455	11	41487	44788.0	44635.1	43766.6	43612.3
CABOG	ORIGINAL	4238132	20211	13	18752	26146.9	24065.7	24932.3	22938.4
MSR-CA	ORIGINAL	4465931	22128	25	20404	24995.8	24213.2	24134.1	23369.9
SGA	ORIGINAL	4637887	2284	2	2280	3565.8	3244.6	3562.1	3240.5
SOAPdenovo	ORIGINAL	4616597	131681	97	47740	158310.5	157150.8	61300.3	60838.4
Velvet	ORIGINAL	4528253	15665	9	15425	19100.9	18549.6	18562.7	18025.9
TOTAL	ORIGINAL	41761773	353157	567	185109	407427.0	400799.0	223895.0	221959.0
AVERAGE	ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4791837.1	1136940.6	99.7	193060.3	796725.9	794391.2	203047.7	201240.4
OPERA	4709514.0	236512.9	209.4	44626.0	233688.7	229996.2	57385.1	56285.1
SCARPA	4767706.7	73649.1	108.2	32125.6	91495.1	90835.9	38791.0	38470.8
SCAFFMATCH	5160734.9	1397003.6	249.8	104462.4	980730.6	981510.9	123429.8	121333.2
SOPRA	4726872.9	66092.0	93.7	30435.8	78270.3	77529.4	38262.5	37917.2
SSPACE	4722690.1	63160.8	88.2	28448.9	68451.6	67792.8	34713.2	34396.6
BESST	4831076.2	1142755.8	113.1	192449.1	799120.5	798560.4	201611.9	199770.3
ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

4.7 Quality indicators: rhodo, c=15

Table S23

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	5493404	297498	400	25318	227671.7	266032.7	32711.3	35063.3
ABySS2	BESST-v2	5321342	565844	38	191757	495883.7	570654.8	205918.8	234975.4
Bambus2	BESST-v2	4402487	2468711	323	16981	1522326.5	1455260.7	20705.2	19649.3
Allpaths-LG	BESST-v2	4607025	2547341	19	648919	1651133.0	1652255.4	515588.5	513918.1
CABOG	BESST-v2	4262168	703420	19	206456	539810.8	499736.5	379719.8	349552.6
MSR-CA	BESST-v2	4483430	525468	38	222750	661428.9	643617.0	264383.1	256289.7
SGA	BESST-v2	5003376	16095	212	3635	73874.1	74173.3	10761.0	9947.5
SOAPdenovo	BESST-v2	4631583	2523392	107	75975	1558751.9	1553249.8	91006.9	90376.7
Velvet	BESST-v2	4581971	658351	30	230838	480751.2	472835.5	239690.8	233191.0
TOTAL	BESST-v2	42786786	10306120	1186	1622629	7211632.0	7187816.0	1760485.0	1742964.0
AVERAGE	BESST-v2	4754087.3	1145124.4	131.8	180292.1	801292.4	798646.2	195609.5	193662.6
ABySS	OPERA	5120830	8237	529	5247	10614.7	11313.2	7984.2	8370.0
ABySS2	OPERA	5296653	20284	82	18731	23195.1	26527.5	20850.4	23721.0
Bambus2	OPERA	4383505	101214	326	15043	129619.8	123374.9	18810.3	17851.6
Allpaths-LG	OPERA	4622122	51122	59	41487	60603.0	60840.5	43763.2	43611.1
CABOG	OPERA	4291960	30175	106	18752	36248.3	33786.9	24936.5	22942.4
MSR-CA	OPERA	4548100	35321	148	20567	39449.3	38918.4	24276.3	23507.4
SGA	OPERA	4782152	5977	971	2326	7205.0	6781.9	3581.0	3257.0
SOAPdenovo	OPERA	4623323	151404	110	47740	176145.6	175112.6	61300.4	60838.5
Velvet	OPERA	4576399	18246	90	15425	23906.6	23466.7	18563.5	18027.0
TOTAL	OPERA	42245044	421980	2421	185318	506987.0	500123.0	224066.0	222126.0
AVERAGE	OPERA	4693893.8	46886.7	269.0	20590.9	56331.9	55569.2	24896.2	24680.7
ABySS	SCARPA	5885549	10890	358	6370	12632.0	15783.3	9468.3	10046.6
ABySS2	SCARPA	5261907	20037	30	18997	22635.8	25717.0	20904.4	23748.1
Bambus2	SCARPA	4372728	93198	305	15043	99643.4	94609.4	18899.3	17935.3
Allpaths-LG	SCARPA	4588301	42455	11	41487	44799.3	44645.7	43777.9	43622.8
CABOG	SCARPA	4238546	20413	13	19157	26359.2	24263.4	25140.5	23129.8
MSR-CA	SCARPA	4464504	22440	26	20567	25289.2	24489.6	24390.5	23601.6
SGA	SCARPA	7221141	10284	324	2370	9005.5	13693.5	3708.6	3550.8
SOAPdenovo	SCARPA	4616550	131681	97	47740	158688.4	157524.3	61548.5	61084.1
Velvet	SCARPA	4527486	15665	11	15425	19891.4	19314.0	18622.4	18073.0
TOTAL	SCARPA	45176712	367063	1175	187156	418944.0	420040.0	226460.0	224792.0
AVERAGE	SCARPA	5019634.7	40784.8	130.6	20795.1	46549.4	46671.1	25162.3	24976.9
ABySS	SCAFFMATCH	6640841	57959	581	12766	46896.9	66351.2	14505.7	15489.0
ABySS2	SCAFFMATCH	5429449	294510	124	61596	360640.2	423333.3	83272.5	94902.3
Bambus2	SCAFFMATCH	4493865	2655284	378	17578	1731783.1	1690491.7	20853.2	19800.2
Allpaths-LG	SCAFFMATCH	4616245	3197186	34	347226	2410622.7	2416992.5	328922.1	327860.3
CABOG	SCAFFMATCH	4279900	704725	44	181186	578909.1	538118.8	243955.5	224578.7
MSR-CA	SCAFFMATCH	4519565	2569524	61	144707	1612880.0	1581678.6	191670.8	185767.6
SGA	SCAFFMATCH	8059103	63540	696	5499	44833.0	75977.9	7815.6	7438.5
SOAPdenovo	SCAFFMATCH	4680014	2530424	135	72231	1552316.0	1564637.2	88713.0	88188.9
Velvet	SCAFFMATCH	4787994	529504	152	94734	486393.0	502884.6	136063.0	133084.3
TOTAL	SCAFFMATCH	47506976	12602656	2205	937523	8825274.0	8860466.0	1115771.0	1097110.0
AVERAGE	SCAFFMATCH	5278552.9	1400295.1	245.0	104169.2	980586.0	984496.2	123974.6	121901.1
ABySS	SOPRA	5625305	9606	318	5989	11188.3	13273.5	9194.7	9740.8
ABySS2	SOPRA	5378451	31135	43	27267	35897.0	41761.3	32732.4	37312.6
Bambus2	SOPRA	4411753	122828	325	16901	143479.4	137447.3	20048.8	19026.0
Allpaths-LG	SOPRA	4597851	76488	20	70013	88322.1	88202.5	80844.2	80570.8
CABOG	SOPRA	4250301	35602	30	28163	48956.9	45193.0	43704.6	40219.6
MSR-CA	SOPRA	4488601	37889	42	29115	44082.5	42921.8	39434.2	38197.3
SGA	SOPRA	6750154	7455	441	2389	7324.3	10341.7	3907.1	3722.2
SOAPdenovo	SOPRA	4634622	234440	109	63017	264222.4	263409.4	72076.3	71560.0
Velvet	SOPRA	4646636	30530	39	25944	40562.1	40547.1	34199.0	33320.9
TOTAL	SOPRA	44783674	585973	1367	268798	684035.0	683098.0	336141.0	333670.0
AVERAGE	SOPRA	4975963.8	65108.1	151.9	29866.4	76003.9	75899.7	37349.0	37074.5
ABySS	SSPACE	5563766	11326	279	7371	13490.2	15781.1	10904.2	11518.6
ABySS2	SSPACE	5374188	29671	44	27017	31710.9	36862.3	29170.5	33252.5
Bambus2	SSPACE	4421967	122828	326	16914	140044.6	134467.6	20325.3	19285.4
Allpaths-LG	SSPACE	4604512	61818	23	59808	72804.7	72811.5	68069.2	67831.9
CABOG	SSPACE	4248848	33216	30	26771	41596.9	38382.7	37256.1	34278.8
MSR-CA	SSPACE	4493193	34781	38	29115	42649.1	41572.0	38694.2	37482.6
SGA	SSPACE	6302075	7018	368	2508	7646.8	9970.2	5557.0	5235.0
SOAPdenovo	SSPACE	4659166	240636	107	62489	226739.6	227378.5	70302.3	69840.2
Velvet	SSPACE	4631861	28113	36	22734	34473.9	34325.8	30372.7	29567.8
TOTAL	SSPACE	44299576	569407	1251	254727	611157.0	611552.0	310652.0	308293.0
AVERAGE	SSPACE	4922175.1	63267.4	139.0	28303.0	67906.3	67950.2	34516.8	34254.8
ABySS	BESST	6417799	381599	922	11561	292203.0	400117.7	13383.8	14329.4
ABySS2	BESST	5421752	572590	80	99394	509935.3	597948.8	154878.2	176690.4
Bambus2	BESST	4402487	2468711	323	16981	1522326.5	1455260.7	20705.2	19649.3
Allpaths-LG	BESST	4613638	2553954	20	645278	1656079.2	1659584.1	498996.4	497381.5
CABOG	BESST	4279075	706736	26	177279	541722.2	503495.7	273871.5	252106.0
MSR-CA	BESST	4504545	526951	48	176049	663660.8	648833.1	199719.2	193608.4
SGA	BESST	5609976	76162	549	2961	106244.0	120675.4	6237.4	5765.9
SOAPdenovo	BESST	4646331	2523392	113	75975	1555951.8	1555444.8	90993.7	90366.9
Velvet	BESST	4622283	667740	47	217317	483514.3	479787.5	233279.8	227006.8
TOTAL	BESST	44517886	10477835	2128	1422795	7331637.0	7421148.0	1492065.0	1476905.0
AVERAGE	BESST	4946431.8	1164203.9	236.4	158088.3	814626.3	824572.0	165785.0	164100.5
ABySS	ORIGINAL	5045660	5872	86	5247	8904.2	9344.6	7978.1	8363.3
ABySS2	ORIGINAL	5269366	19663	19	18731	22038.8	25074.5	20848.9	23719.2
Bambus2	ORIGINAL	4371571	93198	305	15043	99576.4	94520.7	18810.1	17851.5
Allpaths-LG	ORIGINAL	4588376	42455	11	41487	44788.0	44635.1	43766.6	43612.3
CABOG	ORIGINAL	4238132	20211	13	18752	26146.9	24065.7	24932.3	22938.4
MSR-CA	ORIGINAL	4465931	22128	25	20404	24995.8	24213.2	24134.1	23369.9
SGA	ORIGINAL	4637887	2284	2	2280	3565.8	3244.6	3562.1	3240.5
SOAPdenovo	ORIGINAL	4616597	131681	97	47740	158310.5	157150.8	61300.3	60838.4
Velvet	ORIGINAL	4528253	15665	9	15425	19100.9	18549.6	18562.7	18025.9
TOTAL	ORIGINAL	41761773	353157	567	185109	407427.0	400799.0	223895.0	221959.0
AVERAGE	ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4754087.3	1145124.4	131.8	180292.1	801292.4	798646.2	195609.5	193662.6
OPERA	4693893.8	46886.7	269.0	20590.9	56331.9	55569.2	24896.2	24680.7
SCARPA	5019634.7	40784.8	130.6	20795.1	46549.4	46671.1	25162.3	24976.9
SCAFFMATCH	5278552.9	1400295.1	245.0	104169.2	980586.0	984496.2	123974.6	121901.1
SOPRA	4975963.8	65108.1	151.9	29866.4	76003.9	75899.7	37349.0	37074.5
SSPACE	4922175.1	63267.4	139.0	28303.0	67906.3	67950.2	34516.8	34254.8
BESST	4946431.8	1164203.9	236.4	158088.3	814626.3	824572.0	165785.0	164100.5
ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

4.8 Quality indicators: rhodo, c=40

Table S24

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	5353676	166143	298	29159	176021.3	200240.7	35691.1	38212.3
ABySS2	BESST-v2	5316820	565798	38	194878	503885.0	579366.8	226226.5	258134.2
Bambus2	BESST-v2	4414775	2882630	326	17405	1993720.7	1911319.6	20968.4	19894.8
Allpaths-LG	BESST-v2	4607239	2547317	18	670120	1651035.3	1652234.4	541910.9	540155.0
CABOG	BESST-v2	4262531	703478	20	206475	539860.0	499824.6	379671.9	349520.8
MSR-CA	BESST-v2	4483462	525463	37	249790	661474.1	643665.5	276454.4	268003.0
SGA	BESST-v2	4874162	5469	107	3544	50508.5	49229.2	16202.5	14935.9
SOAPdenovo	BESST-v2	4630799	2526966	108	75975	1564137.0	1558646.5	92609.9	91977.1
Velvet	BESST-v2	4580845	656684	28	279741	487276.6	479232.7	282679.1	275056.8
TOTAL	BESST-v2	42524309	10579948	980	1727087	7627918.0	7573760.0	1872415.0	1855890.0
AVERAGE	BESST-v2	4724923.2	1175549.8	108.9	191898.6	847546.5	841528.9	208046.1	206210.0
ABySS	OPERA	5203678	15527	1000	5308	16532.0	17917.4	7984.0	8369.4
ABySS2	OPERA	5377148	78966	384	18997	97388.8	113083.7	21036.0	23932.1
Bambus2	OPERA	4382496	124798	358	15043	189032.0	179883.3	18810.3	17851.6
Allpaths-LG	OPERA	4638118	324847	166	41487	276963.3	279011.2	43761.2	43609.9
CABOG	OPERA	4297057	136217	275	18752	188001.1	175443.2	25070.7	23066.9
MSR-CA	OPERA	4546715	205117	334	20567	231479.6	228295.1	24253.7	23485.8
SGA	OPERA	4830416	9936	1508	2280	12668.4	12057.1	3566.1	3244.1
SOAPdenovo	OPERA	4629424	507892	142	47740	412654.5	410781.4	61299.5	60837.6
Velvet	OPERA	4623834	105643	354	15425	128949.7	127905.8	18563.3	18026.9
TOTAL	OPERA	42528886	1508943	4521	185599	1553669.0	1544378.0	224345.0	222424.0
AVERAGE	OPERA	4725431.8	167660.3	502.3	20622.1	172629.9	171597.6	24927.2	24713.8
ABySS	SCARPA	6495378	18297	607	5471	16706.1	23250.3	8712.0	9307.9
ABySS2	SCARPA	5258484	21211	47	18731	27615.8	31354.4	20802.9	23617.7
Bambus2	SCARPA	4371571	93198	305	15043	99576.4	94520.7	18810.1	17851.5
Allpaths-LG	SCARPA	4599754	91440	24	80937	102680.1	102583.5	91676.7	91335.7
CABOG	SCARPA	4238132	20211	13	18752	26146.9	24065.7	24932.3	22938.4
MSR-CA	SCARPA	4465931	22128	25	20404	24995.8	24213.2	24134.1	23369.9
SGA	SCARPA	8150300	27138	470	2310	21792.3	37752.5	3426.2	3310.7
SOAPdenovo	SCARPA	4616597	131681	97	47740	158310.5	157150.8	61300.3	60838.4
Velvet	SCARPA	4525583	15665	10	15351	19110.7	18548.1	18543.8	17996.8
TOTAL	SCARPA	46721730	440969	1598	224739	496935.0	513439.0	272338.0	270567.0
AVERAGE	SCARPA	5191303.3	48996.6	177.6	24971.0	55215.0	57048.8	30259.8	30063.0
ABySS	SCAFFMATCH	7501873	71481	717	13597	55560.4	89743.4	14651.1	15835.9
ABySS2	SCAFFMATCH	5500359	568906	133	60319	477617.4	568777.4	69903.8	79775.8
Bambus2	SCAFFMATCH	4482143	2718575	366	17578	1802424.8	1754859.1	20900.4	19845.2
Allpaths-LG	SCAFFMATCH	4619382	3199746	36	347226	2412704.7	2420724.2	328764.1	327701.7
CABOG	SCAFFMATCH	4282860	705073	44	181186	578573.2	538221.1	245174.1	225718.9
MSR-CA	SCAFFMATCH	4534942	2558211	75	130480	1594433.6	1569362.2	162183.2	157230.1
SGA	SCAFFMATCH	9400424	72714	663	4833	51991.7	104284.4	7571.5	7354.9
SOAPdenovo	SCAFFMATCH	4713784	2530450	134	72231	1545736.8	1569899.1	88872.0	88378.6
Velvet	SCAFFMATCH	4923781	529504	175	93423	481428.9	512726.0	134705.3	131971.6
TOTAL	SCAFFMATCH	49959548	12954660	2343	920873	9000472.0	9128597.0	1072726.0	1053813.0
AVERAGE	SCAFFMATCH	5551060.9	1439406.7	260.3	102319.2	1000052.4	1014288.5	119191.7	117090.3
ABySS	SOPRA	6213330	12940	377	5590	12944.4	17136.7	8731.7	9334.0
ABySS2	SOPRA	5400036	29671	50	25903	32264.0	37719.2	29549.3	33713.8
Bambus2	SOPRA	4419243	122828	329	16686	143363.9	137594.5	19957.0	18942.3
Allpaths-LG	SOPRA	4598696	76488	22	70013	88018.5	87915.5	80524.4	80251.8
CABOG	SOPRA	4251156	35112	29	28109	48423.8	44709.9	44446.1	40899.2
MSR-CA	SOPRA	4487781	36417	39	29438	42440.8	41323.4	38202.4	37010.3
SGA	SOPRA	7930763	25446	300	2290	19365.1	32534.8	3715.3	3580.2
SOAPdenovo	SOPRA	4683089	234440	106	63017	260772.0	262980.7	72067.4	71626.0
Velvet	SOPRA	4691602	30145	45	24411	40586.9	41006.2	33505.8	32676.4
TOTAL	SOPRA	46675696	603487	1297	265457	688179.0	702921.0	330699.0	328034.0
AVERAGE	SOPRA	5186188.4	67054.1	144.1	29495.2	76464.4	78102.3	36744.4	36448.2
ABySS	SSPACE	6906512	20418	670	6154	17445.2	25877.0	10060.8	10844.2
ABySS2	SSPACE	5482903	29421	96	25899	30745.4	36536.6	28576.6	32640.3
Bambus2	SSPACE	4426851	122828	333	16914	139860.1	134462.9	20292.6	19258.4
Allpaths-LG	SSPACE	4613632	61818	27	59372	73034.4	73188.2	67701.1	67467.4
CABOG	SSPACE	4255066	33216	36	26771	41677.8	38519.3	37250.6	34278.9
MSR-CA	SSPACE	4514415	33498	50	29115	41828.6	40980.4	37918.6	36745.1
SGA	SSPACE	9173238	45097	576	2320	30485.4	59797.5	4552.4	4443.1
SOAPdenovo	SSPACE	4735320	240636	117	62489	222825.5	227536.6	70163.5	69827.5
Velvet	SSPACE	4764106	28113	60	22734	33423.2	34332.7	30051.5	29338.1
TOTAL	SSPACE	48872043	615045	1965	251768	631326.0	671231.0	306568.0	304843.0
AVERAGE	SSPACE	5430227.0	68338.3	218.3	27974.2	70147.3	74581.2	34063.1	33871.4
ABySS	BESST	6384544	298904	952	11074	231091.4	314641.7	12844.4	13742.4
ABySS2	BESST	5448515	576887	113	85113	524991.0	618654.7	128717.3	146829.0
Bambus2	BESST	4415979	2883834	328	17405	1994749.8	1912827.9	20963.1	19895.0
Allpaths-LG	BESST	4613846	2553924	20	645277	1655976.9	1659556.4	498995.5	497379.7
CABOG	BESST	4277736	705423	28	175271	541483.7	503116.5	273678.6	251939.1
MSR-CA	BESST	4506537	527080	57	176059	664828.7	650262.6	193659.6	187740.1
SGA	BESST	5544725	65251	516	2829	76893.3	86147.3	5969.9	5510.9
SOAPdenovo	BESST	4651300	2531332	117	75975	1564362.9	1565838.8	91216.6	90605.0
Velvet	BESST	4632824	661020	60	139824	489169.4	486618.0	218950.6	213089.6
TOTAL	BESST	44476006	10803655	2191	1328827	7743547.0	7797664.0	1444996.0	1426731.0
AVERAGE	BESST	4941778.4	1200406.1	243.4	147647.4	860394.1	866407.1	160555.1	158525.6
ABySS	ORIGINAL	5045660	5872	86	5247	8904.2	9344.6	7978.1	8363.3
ABySS2	ORIGINAL	5269366	19663	19	18731	22038.8	25074.5	20848.9	23719.2
Bambus2	ORIGINAL	4371571	93198	305	15043	99576.4	94520.7	18810.1	17851.5
Allpaths-LG	ORIGINAL	4588376	42455	11	41487	44788.0	44635.1	43766.6	43612.3
CABOG	ORIGINAL	4238132	20211	13	18752	26146.9	24065.7	24932.3	22938.4
MSR-CA	ORIGINAL	4465931	22128	25	20404	24995.8	24213.2	24134.1	23369.9
SGA	ORIGINAL	4637887	2284	2	2280	3565.8	3244.6	3562.1	3240.5
SOAPdenovo	ORIGINAL	4616597	131681	97	47740	158310.5	157150.8	61300.3	60838.4
Velvet	ORIGINAL	4528253	15665	9	15425	19100.9	18549.6	18562.7	18025.9
TOTAL	ORIGINAL	41761773	353157	567	185109	407427.0	400799.0	223895.0	221959.0
AVERAGE	ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4724923.2	1175549.8	108.9	191898.6	847546.5	841528.9	208046.1	206210.0
OPERA	4725431.8	167660.3	502.3	20622.1	172629.9	171597.6	24927.2	24713.8
SCARPA	5191303.3	48996.6	177.6	24971.0	55215.0	57048.8	30259.8	30063.0
SCAFFMATCH	5551060.9	1439406.7	260.3	102319.2	1000052.4	1014288.5	119191.7	117090.3
SOPRA	5186188.4	67054.1	144.1	29495.2	76464.4	78102.3	36744.4	36448.2
SSPACE	5430227.0	68338.3	218.3	27974.2	70147.3	74581.2	34063.1	33871.4
BESST	4941778.4	1200406.1	243.4	147647.4	860394.1	866407.1	160555.1	158525.6
ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

4.9 Quality indicators: rhodo_wide, N=100

Table S25

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	5222029	54734	423	6928	82839.9	90522.5	9855.1	10382.1
ABySS2	BESST-v2	5338425	292438	195	31197	399574.1	461053.7	36560.9	41632.9
Bambus2	BESST-v2	4395360	584904	351	15109	632922.8	604120.0	19327.7	18343.2
Allpaths-LG	BESST-v2	4603147	597277	63	105281	650443.3	650404.4	110727.5	110354.0
CABOG	BESST-v2	4261170	212952	87	46911	372742.1	344938.0	74151.2	68224.8
MSR-CA	BESST-v2	4496169	256343	117	48860	278311.0	271486.2	56179.8	54421.3
SGA	BESST-v2	4645333	2326	19	2316	4893.6	4462.9	3735.1	3399.3
SOAPdenovo	BESST-v2	4629910	1120359	120	53256	825974.0	822496.1	77783.5	77216.9
Velvet	BESST-v2	4568366	582537	112	44115	418347.8	410128.6	62055.7	60287.6
TOTAL	BESST-v2	42159909	3703870	1487	353973	3666049.0	3659612.0	450376.0	444262.0
AVERAGE	BESST-v2	4684434.3	411541.1	165.2	39330.3	407338.7	406623.6	50041.8	49362.5
ABySS	OPERA	5103395	21066	510	8001	23184.0	24621.7	9763.5	10243.9
ABySS2	OPERA	5274724	62406	117	28065	65526.0	74628.0	35127.4	39976.8
Bambus2	OPERA	4378568	226043	353	15044	406943.5	386901.1	19014.4	18046.3
Allpaths-LG	OPERA	4589826	360128	50	104505	397309.0	396078.5	111513.8	111148.8
CABOG	OPERA	4240811	64244	51	49915	125486.1	115570.6	71471.4	65782.3
MSR-CA	OPERA	4471955	116331	63	54665	149560.7	145074.1	78837.0	76382.0
SGA	OPERA	4731548	15667	673	4405	23321.8	21695.6	6033.4	5496.1
SOAPdenovo	OPERA	4620756	487680	118	54495	772637.3	767675.4	70078.6	69556.7
Velvet	OPERA	4535191	58785	64	36837	74066.2	72040.3	50468.5	49034.8
TOTAL	OPERA	41946774	1412350	1999	355932	2038035.0	2004285.0	452308.0	445668.0
AVERAGE	OPERA	4660752.7	156927.8	222.1	39548.0	226448.3	222698.4	50256.4	49518.6
ABySS	SCARPA	5115235	10583	271	6333	15763.8	16787.8	9505.2	9950.1
ABySS2	SCARPA	5293096	49813	135	28065	59773.3	68332.5	30965.8	35233.6
Bambus2	SCARPA	4390635	138941	357	15132	172089.8	164074.8	19486.4	18487.1
Allpaths-LG	SCARPA	4594956	96933	46	74504	116077.4	115847.3	73888.9	73607.5
CABOG	SCARPA	4244039	56484	47	43723	77406.4	71344.3	51188.7	47096.3
MSR-CA	SCARPA	4481181	53601	68	43954	63436.2	61660.3	45864.9	44425.6
SGA	SCARPA	4865339	4555	327	2510	7504.5	7209.3	4649.8	4233.4
SOAPdenovo	SCARPA	4615697	219616	110	53256	274329.2	272295.4	67666.5	67128.9
Velvet	SCARPA	4569722	24796	54	19979	31660.7	31050.3	24997.4	24291.3
TOTAL	SCARPA	42169900	655322	1415	287456	818041.0	808602.0	328214.0	324454.0
AVERAGE	SCARPA	4685544.4	72813.6	157.2	31939.6	90893.5	89844.7	36468.2	36050.4
ABySS	SCAFFMATCH	5500630	62155	994	8944	64740.9	74913.7	10806.7	11430.3
ABySS2	SCAFFMATCH	5313073	304678	209	37867	333141.5	382557.6	41178.5	46908.9
Bambus2	SCAFFMATCH	4403224	2691935	415	15109	1734655.4	1659049.5	19201.5	18229.9
Allpaths-LG	SCAFFMATCH	4594305	1372698	74	109420	1028890.1	1026704.8	132971.6	132536.7
CABOG	SCAFFMATCH	4245372	531929	78	87779	618926.0	570633.9	132392.2	121866.5
MSR-CA	SCAFFMATCH	4482205	836651	98	75567	777817.1	756476.4	96058.6	93097.6
SGA	SCAFFMATCH	5543053	80158	1512	2914	85180.3	95819.2	5437.4	5049.6
SOAPdenovo	SCAFFMATCH	4635069	2719513	163	55634	1744694.5	1741437.9	72466.9	72027.3
Velvet	SCAFFMATCH	4601853	661868	218	53599	543301.6	538744.1	81935.3	79975.6
TOTAL	SCAFFMATCH	43318784	9261585	3761	446833	6931347.0	6846337.0	592449.0	581122.0
AVERAGE	SCAFFMATCH	4813198.2	1029065.0	417.9	49648.1	770149.7	760704.1	65827.6	64569.2
ABySS	SOPRA	5094254	7873	183	5893	10111.6	10720.4	8395.3	8803.2
ABySS2	SOPRA	5276641	21583	38	20037	23801.3	27118.9	21646.6	24629.0
Bambus2	SOPRA	4375836	101214	321	15043	115558.5	109798.5	18842.3	17881.2
Allpaths-LG	SOPRA	4591611	46285	21	44431	48181.9	48051.4	45926.8	45765.9
CABOG	SOPRA	4239527	22166	18	20911	29829.1	27463.8	27452.1	25257.4
MSR-CA	SOPRA	4472356	24146	36	23575	27340.5	26522.7	26046.3	25222.6
SGA	SOPRA	4760337	3434	206	2426	5303.2	4968.1	4026.3	3664.0
SOAPdenovo	SOPRA	4621097	151404	104	53256	188068.2	186927.8	63615.5	63154.5
Velvet	SOPRA	4536210	18236	33	16894	22241.6	21644.7	20186.9	19609.6
TOTAL	SOPRA	41967869	396341	960	202466	470436.0	463216.0	236138.0	233987.0
AVERAGE	SOPRA	4663096.6	44037.9	106.7	22496.2	52270.7	51468.5	26237.6	25998.6
ABySS	SSPACE	5092905	9102	202	6165	12467.8	13215.0	9940.9	10423.8
ABySS2	SSPACE	5277286	27159	59	21509	28579.2	32565.0	24716.7	28120.7
Bambus2	SSPACE	4388198	107963	348	15132	145596.7	138730.5	19308.9	18320.1
Allpaths-LG	SSPACE	4596522	55645	42	48869	71116.4	70999.6	57747.5	57544.2
CABOG	SSPACE	4240071	28009	32	25969	38978.3	35892.1	32550.9	29945.4
MSR-CA	SSPACE	4478785	30829	60	25916	40673.5	39513.7	32341.5	31318.7
SGA	SSPACE	4763268	3274	205	2398	7264.7	6810.4	4761.2	4332.3
SOAPdenovo	SSPACE	4629044	188184	121	53617	218695.5	217699.8	65363.5	64874.5
Velvet	SSPACE	4550866	25948	71	20200	32838.4	32061.0	26318.5	25564.3
TOTAL	SSPACE	42016945	476113	1140	219775	596211	587487.0	273050.0	270444.0
AVERAGE	SSPACE	4668549.4	52901.4	126.7	24419.4	66245.6	65276.3	30338.8	30049.3
ABySS	BESST	5231299	54734	443	6880	83322.3	91217.5	9807.8	10333.8
ABySS2	BESST	5339315	292438	197	31197	399835.7	461432.8	36527.7	41595.0
Bambus2	BESST	4395360	584904	351	15109	632922.8	604120.0	19327.7	18343.2
Allpaths-LG	BESST	4603147	597277	63	105281	650443.3	650404.4	110727.5	110354.0
CABOG	BESST	4261170	212952	87	46911	372742.1	344938.0	74151.2	68224.8
MSR-CA	BESST	4497109	256343	118	48134	278420.4	271649.7	56051.8	54297.3
SGA	BESST	4645553	2326	22	2310	4897.7	4466.9	3711.8	3378.2
SOAPdenovo	BESST	4629910	1120359	120	53256	825974.0	822496.1	77783.5	77216.9
Velvet	BESST	4569750	582537	111	44115	418621.3	410522.7	62096.9	60327.6
TOTAL	BESST	42172613	3703870	1512	353193	3667180.0	3661248.0	450186.0	444071.0
AVERAGE	BESST	4685845.9	411541.1	168.0	39243.7	407464.4	406805.3	50020.7	49341.2
ABySS	ORIGINAL	5045660	5872	86	5247	8904.2	9344.6	7978.1	8363.3
ABySS2	ORIGINAL	5269366	19663	19	18731	22038.8	25074.5	20848.9	23719.2
Bambus2	ORIGINAL	4371571	93198	305	15043	99576.4	94520.7	18810.1	17851.5
Allpaths-LG	ORIGINAL	4588376	42455	11	41487	44788.0	44635.1	43766.6	43612.3
CABOG	ORIGINAL	4238132	20211	13	18752	26146.9	24065.7	24932.3	22938.4
MSR-CA	ORIGINAL	4465931	22128	25	20404	24995.8	24213.2	24134.1	23369.9
SGA	ORIGINAL	4637887	2284	2	2280	3565.8	3244.6	3562.1	3240.5
SOAPdenovo	ORIGINAL	4616597	131681	97	47740	158310.5	157150.8	61300.3	60838.4
Velvet	ORIGINAL	4528253	15665	9	15425	19100.9	18549.6	18562.7	18025.9
TOTAL	ORIGINAL	41761773	353157	567	185109	407427.0	400799.0	223895.0	221959.0
AVERAGE	ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4684434.3	411541.1	165.2	39330.3	407338.7	406623.6	50041.8	49362.5
OPERA	4660752.7	156927.8	222.1	39548.0	226448.3	222698.4	50256.4	49518.6
SCARPA	4685544.4	72813.6	157.2	31939.6	90893.5	89844.7	36468.2	36050.4
SCAFFMATCH	4813198.2	1029065.0	417.9	49648.1	770149.7	760704.1	65827.6	64569.2
SOPRA	4663096.6	44037.9	106.7	22496.2	52270.7	51468.5	26237.6	25998.6
SSPACE	4668549.4	52901.4	126.7	24419.4	66245.6	65276.3	30338.8	30049.3
BESST	4685845.9	411541.1	168.0	39243.7	407464.4	406805.3	50020.7	49341.2
ORIGINAL	4640197.0	39239.7	63.0	20567.7	45269.7	44533.2	24877.2	24662.2

4.10 Quality indicators: rhodo_wide_N=1000

Table S26

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}	
ABySS	BESST-v2	5222029	54734	181	12644	82839.9	90522.5	19354.3	20389.3
ABySS2	BESST-v2	5338425	292438	35	124707	399574.1	461053.7	218532.8	248848.9
Bambus2	BESST-v2	4395360	584904	16	513371	632922.8	604120.0	439274.7	416901.0
Allpaths-LG	BESST-v2	4603147	597277	18	360529	650443.3	650404.4	387367.8	386061.1
CABOG	BESST-v2	4261170	212952	29	125766	372742.1	344938.0	195042.4	179454.1
MSR-CA	BESST-v2	4496169	256343	35	116374	278311.0	271486.2	194246.5	188135.6
SGA	BESST-v2	4645333	2326	9	2320	4893.6	4462.9	4024.2	3662.4
SOAPdenovo	BESST-v2	4629910	1120359	20	528908	825974.0	822496.1	481867.6	478272.6
Velvet	BESST-v2	4568366	582537	32	139384	418347.8	410128.6	214705.0	208587.5
TOTAL	BESST-v2	42159909	3703870	375	1924003	3666049.0	3659612.0	2154415.0	2130312.0
AVERAGE	BESST-v2	4684434.3	411541.1	41.7	213778.1	407338.7	406623.6	239379.5	236701.4
ABySS	OPERA	5103395	21066	245	12447	23184.0	24621.7	14512.1	15226.2
ABySS2	OPERA	5274724	62406	32	47680	65526.0	74628.0	55066.2	62668.2
Bambus2	OPERA	4378568	226043	17	173494	406943.5	386901.1	226635.4	215095.9
Allpaths-LG	OPERA	4589826	360128	17	178605	397309.0	396078.5	243416.1	242619.3
CABOG	OPERA	4240811	64244	20	56489	125486.1	115570.6	83103.0	76488.0
MSR-CA	OPERA	4471955	116331	26	104760	149560.7	145074.1	132536.3	128404.2
SGA	OPERA	4731548	15667	244	9239	23321.8	21695.6	11986.8	10919.4
SOAPdenovo	OPERA	4620756	487680	18	487660	772637.3	767675.4	603373.8	598778.9
Velvet	OPERA	4535191	58785	17	54238	74066.2	72040.3	68344.3	66402.9
TOTAL	OPERA	41946774	1412350	636	1124612	2038035.0	2004285.0	1438974.0	1416603.0
AVERAGE	OPERA	4660752.7	156927.8	70.7	124956.9	226448.3	222698.4	159886.0	157400.3
ABySS	SCARPA	5115235	10583	151	7622	15763.8	16787.8	10715.9	11216.1
ABySS2	SCARPA	5293096	49813	48	41815	59773.3	68332.5	44790.9	50963.3
Bambus2	SCARPA	4390635	138941	19	133919	172089.8	164074.8	151964.7	144171.7
Allpaths-LG	SCARPA	4594956	96933	13	96923	116077.4	115847.3	114818.7	114381.5
CABOG	SCARPA	4244039	56484	17	50012	77406.4	71344.3	73384.1	67517.4
MSR-CA	SCARPA	4481181	53601	28	51607	63436.2	61660.3	58011.3	56188.7
SGA	SCARPA	4865339	4555	94	3290	7504.5	7209.3	6112.5	5565.1
SOAPdenovo	SCARPA	4615697	219616	14	219606	274329.2	272295.4	234243.8	232343.3
Velvet	SCARPA	4569722	24796	21	22726	31660.7	31050.3	28842.1	28027.3
TOTAL	SCARPA	42169900	655322	405	627520	818041.0	808602.0	722884.0	710374.0
AVERAGE	SCARPA	4685544.4	72813.6	45.0	69724.4	90893.5	89844.7	80320.4	78930.5
ABySS	SCAFFMATCH	5500630	62155	468	16458	64740.9	74913.7	19345.6	20461.9
ABySS2	SCAFFMATCH	5313073	304678	66	125520	333141.5	382557.6	177659.0	202381.9
Bambus2	SCAFFMATCH	4403224	2691935	37	291023	1734655.4	1659049.5	341302.8	324033.0
Allpaths-LG	SCAFFMATCH	4594305	1372698	21	551637	1028890.1	1026704.8	572141.9	570270.9
CABOG	SCAFFMATCH	4245372	531929	27	206180	618926.0	570633.9	280549.6	258244.7
MSR-CA	SCAFFMATCH	4482205	836651	49	190519	777817.1	756476.4	221098.4	214274.9
SGA	SCAFFMATCH	5543053	80158	680	9239	85180.3	95819.2	11830.9	10987.1
SOAPdenovo	SCAFFMATCH	4635069	2719513	43	528938	1744694.5	1741437.9	797299.1	792328.7
Velvet	SCAFFMATCH	4601853	661868	114	141828	543301.6	538744.1	195268.4	190598.1
TOTAL	SCAFFMATCH	43318784	9261585	1505	2061342	6931347.0	6846337.0	2616496.0	2583581.0
AVERAGE	SCAFFMATCH	4813198.2	1029065.0	167.2	229038.0	770149.7	760704.1	290721.7	287064.6
ABySS	SOPRA	5094254	7873	99	6586	10111.6	10720.4	8934.3	9368.3
ABySS2	SOPRA	5276641	21583	16	20673	23801.3	27118.9	22342.3	25420.5
Bambus2	SOPRA	4375836	101214	9	97331	115558.5	109798.5	113790.6	107986.9
Allpaths-LG	SOPRA	4591611	46285	13	45025	48181.9	48051.4	47163.9	46998.7
CABOG	SOPRA	4239527	22166	12	21443	29829.1	27463.8	28256.7	25997.6
MSR-CA	SOPRA	4472356	24146	21	23691	27340.5	26522.7	26864.1	26014.6
SGA	SOPRA	4760337	3434	49	2841	5303.2	4968.1	4717.5	4293.1
SOAPdenovo	SOPRA	4621097	151404	11	144469	188068.2	186927.8	179199.0	177870.4
Velvet	SOPRA	4536210	18236	11	18004	22241.6	21644.7	21132.2	20528.0
TOTAL	SOPRA	41967869	396341	241	380063	470436.0	463216.0	452401.0	444478.0
AVERAGE	SOPRA	4663096.6	44037.9	26.8	42229.2	52270.7	51468.5	50266.7	49386.5
ABySS	SSPACE	5092905	9102	109	6935	12467.8	13215.0	10859.3	11386.9
ABySS2	SSPACE	5277286	27159	18	24869	28579.2	32565.0	27081.3	30811.0
Bambus2	SSPACE	4388198	107963	17	102920	145596.7	138730.5	139343.9	132208.6
Allpaths-LG	SSPACE	4596522	55645	15	50957	71116.4	70999.6	69208.3	68964.7
CABOG	SSPACE	4240071	28009	13	26532	38978.3	35892.1	37695.7	34678.5
MSR-CA	SSPACE	4478785	30829	27	28934	40673.5	39513.7	38753.4	37527.7
SGA	SSPACE	4763268	3274	40	2790	7264.7	6810.4	6474.2	5889.7
SOAPdenovo	SSPACE	4629044	188184	15	188184	218695.5	217699.8	205557.5	203985.2
Velvet	SSPACE	4550866	25948	22	23317	32838.4	32061.0	30954.0	30066.9
TOTAL	SSPACE	42016945	476113	276	455438	596211.0	587487.0	565928.0	555519.0
AVERAGE	SSPACE	4668549.4	52901.4	30.7	50604.2	66245.6	65276.3	62880.8	61724.4
ABySS	BESST	5231299	54734	205	12611	83322.3	91217.5	17530.6	18470.8
ABySS2	BESST	5339315	292438	37	119892	399835.7	461432.8	206893.2	235594.6
Bambus2	BESST	4395360	584904	16	513371	632922.8	604120.0	439274.7	416901.0
Allpaths-LG	BESST	4603147	597277	18	360529	650443.3	650404.4	387367.8	386061.1
CABOG	BESST	4261170	212952	29	125766	372742.1	344938.0	195042.4	179454.1
MSR-CA	BESST	4497109	256343	38	110785	278420.4	271649.7	191047.6	185037.4
SGA	BESST	4645553	2326	11	2320	4897.7	4466.9	4005.9	3645.9
SOAPdenovo	BESST	4629910	1120359	20	528908	825974.0	822496.1	481867.6	478272.6
Velvet	BESST	4569750	582537	31	123823	418621.3	410522.7	214430.9	208321.3
TOTAL	BESST	42172613	3703870	405	1898005	3667180.0	3661248.0	2137461.0	2111759.0
AVERAGE	BESST	4685845.9	411541.1	45.0	210889.4	407464.4	406805.3	237495.6	234639.9
ABySS	ORIGINAL	5045660	5872	85	5303	8904.2	9344.6	7981.7	8367.0
ABySS2	ORIGINAL	5269366	19663	15	18997	22038.8	25074.5	21007.1	23899.2
Bambus2	ORIGINAL	4371571	93198	4	93198	99576.4	94520.7	99522.7	94450.7
Allpaths-LG	ORIGINAL	4588376	42455	10	41487	44788.0	44635.1	44340.9	44184.5
CABOG	ORIGINAL	4238132	20211	11	19076	26146.9	24065.7	25365.7	23337.1
MSR-CA	ORIGINAL	4465931	22128	18	21236	24995.8	24213.2	24654.2	23873.6
SGA	ORIGINAL	4637887	2284	1	2280	3565.8	3244.6	3563.9	3242.2
SOAPdenovo	ORIGINAL	4616597	131681	11	129613	158310.5	157150.8	149485.4	148334.0
Velvet	ORIGINAL	4528253	15665	6	15439	19100.9	18549.6	18769.3	18226.6
TOTAL	ORIGINAL	417617730	353157	161	346629	407427	400799.0	394691.0	387915.0
AVERAGE	ORIGINAL	4640197.0	39239.7	17.9	38514.3	45269.7	44533.2	43854.5	43101.7

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4684434.3	411541.1	41.7	213778.1	407338.7	406623.6	239379.5	236701.4
OPERA	4660752.7	156927.8	70.7	124956.9	226448.3	222698.4	159886.0	157400.3
SCARPA	4685544.4	72813.6	45.0	69724.4	90893.5	89844.7	80320.4	78930.5
SCAFFMATCH	4813198.2	1029065.0	167.2	229038.0	770149.7	760704.1	290721.7	287064.6
SOPRA	4663096.6	44037.9	26.8	42229.2	52270.7	51468.5	50266.7	49386.5
SSPACE	4668549.4	52901.4	30.7	50604.2	66245.6	65276.3	62880.8	61724.4
BESST	4685845.9	411541.1	45.0	210889.4	407464.4	406805.3	237495.6	234639.9
ORIGINAL	4640197.0	39239.7	17.9	38514.3	45269.7	44533.2	43854.5	43101.7

4.11 Quality indicators: hs14, c=0

Table S27

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	115304277	3031	5033	1781	88705.0	61242.1	12693.1	8088.7
ABySS2	BESST-v2	103169316	141313	2577	38579	186570.6	166151.7	63120.6	54599.9
Bambus2	BESST-v2	69929346	131426	6996	6843	372743.2	241570.9	31630.1	19863.0
Allpaths-LG	BESST-v2	86042712	389784	949	110560	831609.8	666312.7	188897.9	148545.7
CABOG	BESST-v2	86664240	424030	876	126651	759856.1	613185.2	208545.0	167405.6
MSR-CA	BESST-v2	86012720	20185	4876	6607	53944.5	42304.2	21209.4	16048.2
SGA	BESST-v2	183045734	81940	3180	6714	217026.8	166365.6	33891.1	24096.4
SOAPdenovo	BESST-v2	98641400	242705	14935	10220	371311.1	324081.9	17764.6	14919.0
Velvet	BESST-v2	84688133	2694	3570	1975	53211.3	37492.1	13890.5	9151.4
TOTAL	BESST-v2	913497878	1437108	42992	309930	2934978.0	2318706.0	591642.0	462718.0
AVERAGE	BESST-v2	101499764.2	159678.7	4776.9	34436.7	326108.7	257634.0	65738.0	51413.1
ABySS	OPERA	114395111	2746	6876	1482	12409.3	8277.0	4756.5	2971.8
ABySS2	OPERA	102490928	58995	4585	18102	94654.2	82933.4	27120.0	23279.2
Bambus2	OPERA	69466222	114660	10518	5175	325890.1	209581.7	15732.3	9910.6
Allpaths-LG	OPERA	85622909	363554	2663	43073	697719.3	556214.6	81388.2	63997.7
CABOG	OPERA	86522370	377927	1184	87878	607533.8	489295.1	150309.6	120626.8
MSR-CA	OPERA	83580644	3578	2466	3372	7318.1	5554.9	7099.4	5350.0
SGA	OPERA	178015367	2040	500	1961	4542.5	3213.3	4429.2	3114.2
SOAPdenovo	OPERA	98211306	91445	14748	10232	148638.7	128473.3	17446.0	14580.3
Velvet	OPERA	87582970	62123	19131	2536	134076.5	97292.9	7050.4	4611.7
TOTAL	OPERA	905887827	1077068	62671	173811	2032782.0	1580836.0	315332.0	248442.0
AVERAGE	OPERA	100654203.0	119674.2	6963.4	19312.3	225864.7	175648.5	35036.8	27604.7
ABySS	SCARPA	120766931	4448	7941	1698	14351.3	10740.3	7085.0	4566.3
ABySS2	SCARPA	100613946	11583	390	11176	18385.7	15787.7	17681.2	15172.7
Bambus2	SCARPA	68254930	3801	4363	3107	30959.1	19560.7	9188.9	5788.7
Allpaths-LG	SCARPA	84492580	29380	299	27830	51572.1	40569.7	49257.2	38721.0
CABOG	SCARPA	86279851	268025	942	92150	443673.2	356373.2	157559.4	126074.5
MSR-CA	SCARPA	88606655	9785	7164	5241	27490.0	22265.1	13446.5	10168.3
SGA	SCARPA	186789865	3414	4609	2388	7819.0	6340.0	6229.2	4495.4
SOAPdenovo	SCARPA	95842659	12767	10403	6697	21589.6	18184.3	11843.1	9894.9
Velvet	SCARPA	89149171	7038	9787	2071	24384.2	18405.9	8498.7	5573.3
TOTAL	SCARPA	920796588	350241	45898	152358	640224.0	508227.0	280789.0	220455.0
AVERAGE	SCARPA	102310732.0	38915.7	5099.8	16928.7	71136.0	56469.7	31198.8	24495.0
ABySS	SCAFFMATCH	144374232	36190	21119	2049	51446.2	51231.2	8094.0	5457.6
ABySS2	SCAFFMATCH	105964492	75076	5402	23764	107932.4	98526.8	38818.5	33493.2
Bambus2	SCAFFMATCH	70667265	110051	9800	5895	278865.8	182673.4	20205.9	12741.8
Allpaths-LG	SCAFFMATCH	85913895	310670	1690	66702	536990.4	429601.1	119078.1	93650.0
CABOG	SCAFFMATCH	86622862	309125	1098	95753	502895.7	405592.2	153031.1	122832.1
MSR-CA	SCAFFMATCH	96685978	84793	13569	8903	137016.3	122133.0	19098.5	14599.2
SGA	SCAFFMATCH	202674463	45126	18783	3997	66491.7	64303.5	9294.0	6815.1
SOAPdenovo	SCAFFMATCH	101422492	105341	15543	10626	158569.5	142580.4	18500.9	15556.0
Velvet	SCAFFMATCH	110464939	49419	16086	3573	68187.1	66129.5	10776.9	7375.1
TOTAL	SCAFFMATCH	1004790618	1125791	103090	221262	1908395.0	1562771.0	396898.0	312520.0
AVERAGE	SCAFFMATCH	111643402.0	125087.9	11454.4	24584.7	212043.9	173641.2	44099.8	34724.5
ABySS	SOPRA	122196298	35595	15730	3067	83597.3	63748.1	8491.5	5487.9
ABySS2	SOPRA	102853917	93579	3453	29041	131396.9	116453.5	45360.9	39188.4
Bambus2	SOPRA	69504036	76879	7598	7331	274646.2	177057.6	26597.7	16739.0
Allpaths-LG	SOPRA	85778806	312131	1523	69507	531018.5	424122.1	118191.8	92933.4
CABOG	SOPRA	86527142	293429	947	91643	481293.2	387692.6	163498.6	131191.0
MSR-CA	SOPRA	86631019	13114	6598	6419	27471.5	21641.7	14133.6	10661.5
SGA	SOPRA	179142724	2908	2097	2235	7973.4	5724.6	6309.1	4435.4
SOAPdenovo	SOPRA	98452079	54851	12987	10694	102630.2	89240.6	18640.8	15628.3
Velvet	SOPRA	92754633	66184	14094	4490	134075.2	105946.8	14480.6	9692.5
TOTAL	SOPRA	923840654	948670	65027	224427	1774102.0	1391628.0	415705.0	325957.0
AVERAGE	SOPRA	102648961.6	105407.8	7225.2	24936.3	197122.5	154625.3	46189.4	36217.5
ABySS	SSPACE	124861147	8647	6407	1828	19891.0	15330.7	9427.6	5947.7
ABySS2	SSPACE	103707822	46625	2797	24534	74359.5	66072.6	40943.8	35177.7
Bambus2	SSPACE	69866491	59482	7312	7495	193695.7	125351.5	32589.9	20469.2
Allpaths-LG	SSPACE	85888904	295624	1636	66667	483024.7	386272.0	118740.4	93362.8
CABOG	SSPACE	86569996	287205	961	103978	522726.5	421233.8	170256.1	136596.9
MSR-CA	SSPACE	90419103	30091	8248	8609	58170.9	47933.7	18977.1	14335.6
SGA	SSPACE	189462120	13016	6412	4085	27292.8	22322.1	12582.1	8883.6
SOAPdenovo	SSPACE	99060435	71755	13245	10615	133518.9	116599.7	18668.5	15619.0
Velvet	SSPACE	93973727	11842	7427	2686	25846.7	20397.1	10839.4	7133.8
TOTAL	SSPACE	943809745	824287	54445	230497	1538527.0	1221513.0	433025.0	337526.0
AVERAGE	SSPACE	104867749.4	91587.4	6049.4	25610.8	170947.4	135723.7	48113.9	37502.9
ABySS	BESST	120681407	5783	10536	1602	103602.9	76717.1	8499.6	5432.0
ABySS2	BESST	105564125	148446	4832	30410	193384.4	176533.9	51062.2	44208.4
Bambus2	BESST	70125976	134615	7134	6704	373674.2	242858.7	31027.9	19485.3
Allpaths-LG	BESST	86061071	389784	954	110560	831770.2	666583.5	188881.3	148532.9
CABOG	BESST	86676366	424030	887	126651	759929.8	613330.6	204754.4	164362.2
MSR-CA	BESST	86570489	21325	5185	6378	54606.5	43107.0	20219.6	15298.7
SGA	BESST	186746340	114833	6824	4111	232688.9	186393.0	19053.3	13595.0
SOAPdenovo	BESST	99667343	249007	15965	9968	375179.7	331044.0	17550.4	14743.1
Velvet	BESST	86896045	3051	5297	1910	57274.9	41533.3	10924.6	7205.7
TOTAL	BESST	928989162	1490874	57614	298294	2982112.0	2378101.0	551973.0	432863.0
AVERAGE	BESST	103221018.0	165652.7	6401.6	33143.8	331345.7	264233.5	61330.4	48095.9
ABySS	ORIGINAL	109866901	1321	75	1317	4300.8	2687.2	4277.9	2672.2
ABySS2	ORIGINAL	100583715	11458	349	11084	18149.9	15580.0	17569.9	15077.2
Bambus2	ORIGINAL	68243158	3738	4335	3086	30320.6	19153.9	9063.9	5710.3
Allpaths-LG	ORIGINAL	84461065	27960	228	27023	49191.5	38682.6	47855.5	37618.4
CABOG	ORIGINAL	86255201	35864	447	33120	60225.3	48354.3	55795.1	44762.8
MSR-CA	ORIGINAL	83580644	3578	2466	3372	7318.1	5554.9	7099.4	5350.0
SGA	ORIGINAL	177570820	1947	109	1945	4408.8	3100.5	4406.3	3098.0
SOAPdenovo	ORIGINAL	95824338	12614	10364	6648	21384.2	18007.5	11789.5	9850.4
Velvet	ORIGINAL	80259793	1595	609	1570	4077.3	2680.5	4050.8	2647.5
TOTAL	ORIGINAL	886645635	100075	18982	89165	199376.0	153801.0	161908.0	126787.0
AVERAGE	ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	101499764.2	159678.7	4776.9	34436.7	326108.7	257634.0	65738.0	51413.1
OPERA	100654203.0	119674.2	6963.4	19312.3	225864.7	175648.5	35036.8	27604.7
SCARPA	102310732.0	38915.7	5099.8	16928.7	71136.0	56469.7	31198.8	24495.0
SCAFFMATCH	111643402.0	125087.9	11454.4	24584.7	212043.9	173641.2	44099.8	34724.5
SOPRA	102648961.6	105407.8	7225.2	24936.3	197122.5	154625.3	46189.4	36217.5
SSPACE	104867749.4	91587.4	6049.4	25610.8	170947.4	135723.7	48113.9	37502.9
BESST	103221018.0	165652.7	6401.6	33143.8	331345.7	264233.5	61330.4	48095.9
ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

4.12 Quality indicators: hs14, c=15

Table S28

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	114981560	3182	5642	1836	91164.5	63392.9	12527.7	8038.2
ABySS2	BESST-v2	102820931	152896	2881	40020	208405.7	186127.9	64656.0	56228.5
Bambus2	BESST-v2	69907302	108092	6967	6522	312944.9	202776.9	31093.8	19531.7
Allpaths-LG	BESST-v2	86030510	404903	951	108816	853141.9	683483.3	187119.3	147152.9
CABOG	BESST-v2	86665500	432367	882	126623	773243.8	624024.0	209102.5	167862.0
MSR-CA	BESST-v2	85689642	14116	4642	5609	46152.7	36057.9	19740.6	14933.9
SGA	BESST-v2	182631088	111406	4026	7538	266066.6	205465.8	34040.2	24437.4
SOAPdenovo	BESST-v2	98688085	248703	15515	10201	365923.4	320478.1	17687.3	14889.0
Velvet	BESST-v2	84317473	2576	3722	1928	47307.1	33232.3	12741.6	8399.9
TOTAL	BESST-v2	911732091	1478241	45228	309093	2964351.0	2355039.0	588709.0	461474.0
AVERAGE	BESST-v2	101303565.7	164249.0	5025.3	34343.7	329372.3	261671.0	65412.1	51274.8
ABySS	OPERA	110337510	1860	6310	1347	5077.4	3194.7	4287.4	2678.0
ABySS2	OPERA	101121466	25638	4995	13125	36550.6	31558.3	19850.9	17033.9
Bambus2	OPERA	69717378	6357	8417	3087	34722.4	22411.4	9067.2	5711.2
Allpaths-LG	OPERA	84640811	87406	2798	30905	138886.6	109448.3	52701.0	41427.7
CABOG	OPERA	86309796	59441	1115	38570	98557.4	79180.9	65006.6	52160.5
MSR-CA	OPERA	84635012	6429	12933	3380	10512.1	8082.6	7121.1	5364.4
SGA	OPERA	177608114	1974	397	1945	4434.5	3120.1	4406.6	3098.3
SOAPdenovo	OPERA	96411214	26947	15179	7522	38893.8	32965.0	12773.8	10670.4
Velvet	OPERA	81233833	4172	17125	1668	8102.2	5400.2	4084.5	2668.0
TOTAL	OPERA	892015134	220224	69269	101549	375737	295362.0	179299.0	140812.0
AVERAGE	OPERA	99112792.7	24469.3	7696.6	11283.2	41748.6	32817.9	19922.1	15645.8
ABySS	SCARPA	122711097	4841	8496	1711	14924.9	11510.9	7075.0	4591.5
ABySS2	SCARPA	100583715	11458	349	11084	18149.9	15580.0	17569.9	15077.2
Bambus2	SCARPA	69191305	37832	6003	7420	141301.5	90513.0	35156.4	22042.9
Allpaths-LG	SCARPA	85523266	199710	1440	61966	345417.1	275043.3	110651.9	86965.3
CABOG	SCARPA	86258720	36595	463	33476	61242.7	49173.2	56415.3	45258.9
MSR-CA	SCARPA	88240789	12105	7737	5605	30674.4	24681.6	13528.9	10211.4
SGA	SCARPA	192483298	3098	3801	2180	6199.8	5402.7	5450.4	3974.6
SOAPdenovo	SCARPA	97320164	40918	12237	9451	90380.7	77381.5	17443.0	14528.9
Velvet	SCARPA	89395898	7338	9952	2098	24380.4	18492.5	8498.0	5580.9
TOTAL	SCARPA	931708252	353895	50478	134991	732671.0	567779.0	271789.0	208232.0
AVERAGE	SCARPA	103523139.1	39321.7	5608.7	14999.0	81407.9	63086.5	30198.8	23136.8
ABySS	SCAFFMATCH	145939931	36960	20888	2047	51886.9	52502.3	8124.1	5489.6
ABySS2	SCAFFMATCH	106021445	78504	5402	24024	111058.2	101445.5	39303.2	33913.6
Bambus2	SCAFFMATCH	70669338	110884	9799	5895	279043.0	182796.1	20243.2	12765.6
Allpaths-LG	SCAFFMATCH	85917238	311203	1687	66702	541690.6	433378.2	120940.6	95114.8
CABOG	SCAFFMATCH	86626609	311972	1097	96423	522073.7	421077.2	153377.0	123109.7
MSR-CA	SCAFFMATCH	96813341	88591	13627	8934	138856.6	123962.2	19217.9	14693.5
SGA	SCAFFMATCH	203723412	47146	18693	4038	67525.5	66048.3	9400.0	6904.9
SOAPdenovo	SCAFFMATCH	101544313	105341	15576	10620	159169.7	143333.2	18486.2	15547.1
Velvet	SCAFFMATCH	110890350	49803	16108	3566	69144.1	67356.2	10799.0	7394.0
TOTAL	SCAFFMATCH	1008145977	1140404	102877	222249	1940448.0	1591899.0	399891.0	314933.0
AVERAGE	SCAFFMATCH	112016219.7	126711.6	11430.8	24694.3	215605.4	176877.7	44432.4	34992.5
ABySS	SOPRA	115378191	4377	5130	1679	14374.1	9737.4	7334.5	4590.6
ABySS2	SOPRA	103851816	76298	4570	25636	111814.5	100244.2	41509.4	35915.9
Bambus2	SOPRA	69555227	38178	7293	6372	149343.1	96335.9	25602.7	16114.1
Allpaths-LG	SOPRA	85773218	305327	1506	69528	501560.4	400568.1	117259.6	92200.3
SGA	SOPRA	177689026	1973	358	1951	4700.5	3310.8	4562.7	3207.9
SOAPdenovo	SOPRA	98890587	50239	13352	10286	94477.8	82622.3	18342.6	15396.2
Velvet	SOPRA	93305642	60875	14539	4167	118491.2	94288.3	13512.5	9049.4
TOTAL	SOPRA	744443707	537267	46748	119619	994762.0	787107.0	228124.0	176474.0
AVERAGE	SOPRA	106349101.0	76752.4	6678.3	17088.4	142108.8	112443.9	32589.1	25210.6
ABySS	SSPACE	125149722	8516	6360	1802	19529.0	15123.2	9382.7	5928.5
ABySS2	SSPACE	103954083	45871	2791	24392	73320.7	65368.7	40825.2	35103.8
Bambus2	SSPACE	69854452	57999	7299	7491	192315.3	124439.3	32573.4	20459.3
Allpaths-LG	SSPACE	85890362	295624	1637	66665	481856.2	385346.9	118610.2	93261.1
CABOG	SSPACE	86571200	284117	963	103978	508723.7	409955.5	167888.5	134697.4
MSR-CA	SSPACE	90449557	29718	8233	8602	57446.5	47361.7	18962.1	14327.2
SGA	SSPACE	190751017	12108	6280	3929	25646.5	21379.9	12327.5	8750.3
SOAPdenovo	SSPACE	99243236	69494	13252	10608	131867.8	115443.1	18612.5	15580.8
Velvet	SSPACE	94008501	11748	7392	2675	25641.0	20248.3	10812.6	7118.3
TOTAL	SSPACE	945872130	815195	54207	230142	1516347.0	1204667.0	429995.0	335227.0
AVERAGE	SSPACE	105096903.3	90577.2	6023.0	25571.3	168483.0	133851.8	47777.2	37247.4
ABySS	BESST	124437118	34366	16694	1533	116293.0	91109.8	6979.8	4512.7
ABySS2	BESST	107816322	171064	8101	26174	222928.2	209471.8	43286.5	37721.2
Bambus2	BESST	70233579	109788	7213	6347	314290.1	204603.7	29946.0	18812.6
Allpaths-LG	BESST	86080299	404903	969	108659	853800.7	684407.1	186650.0	146786.0
CABOG	BESST	86714842	432367	919	125485	773533.4	624613.3	203581.3	163428.6
MSR-CA	BESST	86466194	15218	5148	5376	46979.6	37043.8	18507.8	14004.6
SGA	BESST	190707890	184231	12711	3484	306304.5	259584.8	13314.1	9628.9
SOAPdenovo	BESST	100701982	267594	17673	9714	372925.5	333606.7	17217.2	14505.2
Velvet	BESST	87733633	3085	6648	1837	53298.1	39136.9	8929.6	5899.8
TOTAL	BESST	940891859	1622616	76076	288609	3060353.0	2483578.0	528412.0	415300.0
AVERAGE	BESST	104543539.9	180290.7	8452.9	32067.7	340039.2	275953.1	58712.5	46144.4
ABySS	ORIGINAL	109866901	1321	75	1317	4300.8	2687.2	4277.9	2672.2
ABySS2	ORIGINAL	100583715	11458	349	11084	18149.9	15580.0	17569.9	15077.2
Bambus2	ORIGINAL	68243158	3738	4335	3086	30320.6	19153.9	9063.9	5710.3
Allpaths-LG	ORIGINAL	84461065	27960	228	27023	49191.5	38682.6	47855.5	37618.4
CABOG	ORIGINAL	86255201	35864	447	33120	60225.3	48354.3	55795.1	44762.8
MSR-CA	ORIGINAL	83580644	3578	2466	3372	7318.1	5554.9	7099.4	5350.0
SGA	ORIGINAL	177570820	1947	109	1945	4408.8	3100.5	4406.3	3098.0
SOAPdenovo	ORIGINAL	95824338	12614	10364	6648	21384.2	18007.5	11789.5	9850.4
Velvet	ORIGINAL	80259793	1595	609	1570	4077.3	2680.5	4050.8	2647.5
TOTAL	ORIGINAL	886645635	100075	18982	89165	199376.0	153801.0	161908.0	126787.0
AVERAGE	ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	101303565.7	164249.0	5025.3	34343.7	329372.3	261671.0	65412.1	51274.8
OPERA	99112792.7	24469.3	7696.6	11283.2	41748.6	32817.9	19922.1	15645.8
SCARPA	103523139.1	39321.7	5608.7	14999.0	81407.9	63086.5	30198.8	23136.8
SCAFFMATCH	112016219.7	126711.6	11430.8	24694.3	215605.4	176877.7	44432.4	34992.5
SOPRA	106349101.0	76752.4	6678.3	17088.4	142108.8	112443.9	32589.1	25210.6
SSPACE	105096903.3	90577.2	6023.0	25571.3	168483.0	133851.8	47777.2	37247.4
BESST	104543539.9	180290.7	8452.9	32067.7	340039.2	275953.1	58712.5	46144.4
ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

4.13 Quality indicators: hs14, c=40

Table S29

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
ABySS	BESST-v2	112870380	2037	4171	1602	43591.6	29165.0	10648.4	6780.0
ABySS2	BESST-v2	102468935	132927	2848	38873	189967.9	169282.7	61994.9	53954.7
Bambus2	BESST-v2	69532287	34526	6369	4406	158549.4	102133.7	26143.0	16432.1
Allpaths-LG	BESST-v2	86043805	407005	957	110560	865781.2	693728.4	187594.0	147530.1
CABOG	BESST-v2	86673324	437189	897	125852	775933.2	626284.8	207169.2	166321.3
MSR-CA	BESST-v2	84676556	4881	3679	3995	25750.4	19848.5	15720.3	11876.6
SGA	BESST-v2	180644645	59164	4042	4619	192297.9	146256.7	29381.7	21214.8
SOAPdenovo	BESST-v2	98139884	166746	14924	9885	263837.1	229565.4	17396.5	14629.2
Velvet	BESST-v2	82188894	1958	2134	1727	20467.7	13910.0	9970.0	6549.1
TOTAL	BESST-v2	903238710	1246433	40021	301519	2536176.0	2030175.0	566018.0	445288.0
AVERAGE	BESST-v2	100359856.7	138492.6	4446.8	33502.1	281797.4	225575.0	62890.9	49476.4
ABySS	OPERA	110418156	1882	6651	1333	5091.3	3207.3	4283.1	2675.2
ABySS2	OPERA	103433215	23424	8347	11084	34019.9	30105.9	17571.1	15075.4
Bambus2	OPERA	71403719	20752	13363	3086	64186.9	42437.4	9065.5	5709.7
Allpaths-LG	OPERA	85252340	43812	1878	27016	78997.5	62703.3	47852.1	37617.3
CABOG	OPERA	87518156	104537	2486	33168	169126.2	137779.6	55810.3	44775.1
MSR-CA	OPERA	86545897	10407	17457	3372	18371.5	14452.6	7107.7	5355.5
SGA	OPERA	177589969	1953	224	1945	4412.4	3103.8	4406.3	3098.0
SOAPdenovo	OPERA	98211613	28635	17702	6647	47085.5	40697.7	11794.1	9851.5
Velvet	OPERA	82307993	4581	18616	1614	9033.6	6111.3	4067.6	2657.0
TOTAL	OPERA	902681058	239983	86724	89265	430325.0	340599.0	161958.0	126815.0
AVERAGE	OPERA	100297895.3	26664.8	9636.0	9918.3	47813.9	37844.3	17995.3	14090.5
ABySS	SCARPA	128580000	5212	10171	1546	11948.6	9946.3	6142.6	4031.9
ABySS2	SCARPA	100676151	23963	1244	18313	43931.6	37749.1	31548.0	26929.2
Bambus2	SCARPA	68346459	9309	4885	4852	54013.2	34172.7	21948.5	13784.6
Allpaths-LG	SCARPA	84712090	62913	771	44473	133330.3	105158.3	85854.1	67476.2
CABOG	SCARPA	86125061	110440	716	72341	210029.0	168375.6	127039.9	101661.8
SGA	SCARPA	186722667	3386	4396	2373	7701.0	6245.0	6183.1	4465.4
SOAPdenovo	SCARPA	95740527	27955	11479	8929	60932.9	51268.8	16844.7	13996.9
Velvet	SCARPA	91375876	7058	10776	1980	20351.5	15873.8	7896.8	5197.5
TOTAL	SCARPA	842278831	250236	44438	154807	542238.0	428790.0	303458.0	237544.0
AVERAGE	SCARPA	105284853.9	31279.5	5554.8	19350.9	67779.8	53598.7	37932.2	29692.9
ABySS	SCAFFMATCH	163114336	46046	20393	1927	54270.4	64372.2	7911.7	5459.2
ABySS2	SCAFFMATCH	107491887	90516	5882	24166	119521.3	111031.9	39097.0	33805.9
Bambus2	SCAFFMATCH	70839065	115057	9858	5882	284768.1	187050.9	20264.5	12782.0
Allpaths-LG	SCAFFMATCH	85939266	313922	1721	66702	557128.3	445852.4	120904.1	95087.8
CABOG	SCAFFMATCH	86646055	316451	1098	96423	524377.0	423036.2	153989.5	123600.6
MSR-CA	SCAFFMATCH	99254203	107132	14084	8807	165827.4	152151.6	18888.5	14478.7
SGA	SCAFFMATCH	215736733	63265	19700	3864	79093.2	87349.6	9216.3	6902.2
SOAPdenovo	SCAFFMATCH	104184432	112255	16149	10528	162364.7	150749.3	18374.2	15516.2
Velvet	SCAFFMATCH	198916759	61442	17286	6471	50663.4	86635.2	7360.6	9893.1
TOTAL	SCAFFMATCH	1132122736	1226086	106171	224770	1998014.0	1708229.0	396006.0	317526.0
AVERAGE	SCAFFMATCH	125791415.1	136231.8	11796.8	24974.4	222001.5	189803.3	44000.7	35280.6
ABySS	SOPRA	109876058	1322	84	1317	4312.6	2694.9	4284.9	2676.6
ABySS2	SOPRA	106041097	48373	5142	21292	79379.6	72874.0	35299.7	30595.7
Bambus2	SOPRA	69511961	11619	6569	4231	71468.7	46065.4	20112.5	12663.7
Allpaths-LG	SOPRA	85764073	272612	1548	67363	442431.6	353319.1	115281.4	90646.2
CABOG	SOPRA	86544186	249983	965	88458	430620.5	346963.2	158631.1	127292.7
SGA	SOPRA	177570820	1947	109	1945	4408.8	3100.5	4406.3	3098.0
SOAPdenovo	SOPRA	95825397	12637	10368	6651	21431.5	18047.7	11798.6	9858.0
Velvet	SOPRA	80259793	1595	609	1570	4077.3	2680.5	4050.8	2647.5
TOTAL	SOPRA	811393385	600088	25394	192827	1058131.0	845745.0	353865.0	279478.0
AVERAGE	SOPRA	101424173.1	75011.0	3174.2	24103.4	132266.3	105718.2	44233.2	34934.8
ABySS	SSPACE	133950019	6916	5908	1589	14328.2	12557.8	8287.4	5402.7
ABySS2	SSPACE	107732515	37533	2762	22827	59787.0	55847.7	38388.3	33291.2
Bambus2	SSPACE	69843939	48945	7182	7222	171306.4	110883.1	32135.8	20193.8
Allpaths-LG	SSPACE	85874686	288416	1634	66665	474007.6	379006.7	118199.3	92940.1
CABOG	SSPACE	86589754	278914	960	101951	499650.4	402752.1	166541.1	133622.6
MSR-CA	SSPACE	90754074	22818	7940	7948	45821.4	38019.1	18076.7	13701.6
SGA	SSPACE	205954673	7729	5186	2519	13901.9	13978.5	9620.7	7121.3
SOAPdenovo	SSPACE	102301018	59361	13306	10202	103893.7	94545.6	18177.7	15329.2
Velvet	SSPACE	95683341	8681	6961	2249	20314.4	16504.3	9982.8	6642.0
TOTAL	SSPACE	978684019	759313	51839	223172	1403011.0	1124095.0	419410.0	328244.0
AVERAGE	SSPACE	108742668.8	84368.1	5759.9	24796.9	155890.1	124899.4	46601.1	36471.6
ABySS	BESST	120929274	3356	12367	1425	58212.6	43317.2	6257.6	4003.6
ABySS2	BESST	108548988	155370	9303	24597	205054.7	194340.7	39686.1	34636.4
Bambus2	BESST	69849470	35821	6633	4310	159027.0	102911.3	25358.9	15940.6
Allpaths-LG	BESST	86140034	407005	986	108081	867027.1	695504.0	186369.1	146569.8
CABOG	BESST	86752283	437189	963	124560	776596.7	627391.6	200952.2	161328.7
MSR-CA	BESST	85235178	5153	4108	3939	26194.5	20327.1	14708.1	11112.0
SGA	BESST	193858382	140666	17358	2680	246022.9	217401.7	10114.8	7386.7
SOAPdenovo	BESST	100363520	174514	17164	9353	268720.4	239380.7	16908.7	14235.2
Velvet	BESST	84525013	2167	4242	1683	23278.5	16326.8	7243.2	4764.1
TOTAL	BESST	936202142	1361241	73124	280628	2630134.0	2156901.0	507599.0	399977.0
AVERAGE	BESST	104022460.2	151249.0	8124.9	31180.9	292237.2	239655.7	56399.9	44441.9
ABySS	ORIGINAL	109866901	1321	75	1317	4300.8	2687.2	4277.9	2672.2
ABySS2	ORIGINAL	100583715	11458	349	11084	18149.9	15580.0	17569.9	15077.2
Bambus2	ORIGINAL	68243158	3738	4335	3086	30320.6	19153.9	9063.9	5710.3
Allpaths-LG	ORIGINAL	84461065	27960	228	27023	49191.5	38682.6	47855.5	37618.4
CABOG	ORIGINAL	86255201	35864	447	33120	60225.3	48354.3	55795.1	44762.8
MSR-CA	ORIGINAL	83580644	3578	2466	3372	7318.1	5554.9	7099.4	5350.0
SGA	ORIGINAL	177570820	1947	109	1945	4408.8	3100.5	4406.3	3098.0
SOAPdenovo	ORIGINAL	95824338	12614	10364	6648	21384.2	18007.5	11789.5	9850.4
Velvet	ORIGINAL	80259793	1595	609	1570	4077.3	2680.5	4050.8	2647.5
TOTAL	ORIGINAL	886645635	100075	18982	89165	199376.0	153801.0	161908.0	126787.0
AVERAGE	ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	100359856.7	138492.6	4446.8	33502.1	281797.4	225575.0	62890.9	49476.4
OPERA	100297895.3	26664.8	9636.0	9918.3	47813.9	37844.3	17995.3	14090.5
SCARPA	105284853.9	31279.5	5554.8	19350.9	67779.8	53598.7	37932.2	29692.9
SCAFFMATCH	125791415.1	136231.8	11796.8	24974.4	222001.5	189803.3	44000.7	35280.6
SOPRA	101424173.1	75011.0	3174.2	24103.4	132266.3	105718.2	44233.2	34934.8
SSPACE	108742668.8	84368.1	5759.9	24796.9	155890.1	124899.4	46601.1	36471.6
BESST	104022460.2	151249.0	8124.9	31180.9	292237.2	239655.7	56399.9	44441.9
ORIGINAL	98516181.7	11119.4	2109.1	9907.2	22152.9	17089.0	17989.8	14087.4

4.14 Quality indicators: ecoli_wide, N=100

Table S30

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
minia-short-contigs	BESST-v2	4677131	4614632	125	82941	4593680.9	4590430.9	108946.5	106767.5
minia-short-contigs-multik	BESST-v2	4652383	1825286	76	132664	1874396.8	1868027.3	148081.8	145550.3
velvet-short-scaffolds	BESST-v2	4638385	3630578	75	132667	2957328.7	2949444.8	157992.2	155019.7
spades-all-contigs	BESST-v2	4623001	925476	45	174666	890127.4	885340.5	183833.5	182004.3
spades-all-scaffolds	BESST-v2	4628480	1124983	34	196841	1350375.9	1344253.6	274321.8	271536.4
spades-short-contigs	BESST-v2	4623759	837523	61	133189	1040999.3	1035393.0	163686.6	160899.4
spades-short-scaffolds	BESST-v2	4624305	837614	60	153759	1040738.0	1035098.8	165218.7	162405.2
TOTAL	BESST-v2	32467444	13796092	476	1006727	13747647.0	13707989.0	1202081.0	1184183.0
AVERAGE	BESST-v2	4638206.3	1970870.3	68.0	143818.1	1963949.6	1958284.1	171725.9	169169.0
minia-short-contigs	OPERA	4607204	203356	72	66213	236736.9	232270.1	81950.2	80158.2
minia-short-contigs-multik	OPERA	4602349	579774	48	117711	457328.0	449819.0	145365.8	142686.9
velvet-short-scaffolds	OPERA	4580253	689469	67	109196	615714.2	605654.9	128728.7	126173.0
spades-all-contigs	OPERA	4603511	398826	23	174666	510334.5	505054.5	187849.0	185864.2
spades-all-scaffolds	OPERA	4613866	1149028	21	182565	848343.4	841459.9	251011.4	248360.4
spades-short-contigs	OPERA	4571178	134188	12	128972	228128.6	224015.9	144700.1	142088.9
spades-short-scaffolds	OPERA	4571821	174196	14	132750	252854.1	248330.7	143718.0	141136.0
TOTAL	OPERA	32150182	3328837	257	912073	3149440.0	3106605.0	1083323.0	1066468.0
AVERAGE	OPERA	4592883.1	475548.1	36.7	130296.1	449920.0	443800.7	154760.5	152352.5
minia-short-contigs	SCARPA	4605195	30674	24	29088	36890.9	36181.4	34623.4	33856.2
minia-short-contigs-multik	SCARPA	4600315	97905	18	67380	100101.2	98413.7	84362.5	82796.1
velvet-short-scaffolds	SCARPA	4578439	133437	28	106865	168492.3	165673.7	120860.7	118450.3
spades-all-contigs	SCARPA	4605218	222516	15	173122	237081.9	234716.2	171590.6	169753.9
spades-all-scaffolds	SCARPA	4612683	501306	20	182565	565747.7	561012.9	251100.4	248448.5
spades-short-contigs	SCARPA	4577158	133189	24	108018	163923.3	161179.4	129702.4	127318.2
spades-short-scaffolds	SCARPA	4577177	148283	25	112394	176928.2	173967.3	133562.0	131117.4
TOTAL	SCARPA	32156185	1267310	154	779432	1449166.0	1431145.0	925802.0	911741.0
AVERAGE	SCARPA	4593740.7	181044.3	22.0	111347.4	207023.6	204449.2	132257.4	130248.7
minia-short-contigs	SCAFFMATCH	4641541	1287367	159	66205	1293679.6	1280658.8	95015.8	93062.7
minia-short-contigs-multik	SCAFFMATCH	4622805	1448889	103	107376	1560511.0	1543065.0	137120.9	134709.0
velvet-short-scaffolds	SCAFFMATCH	4592744	647420	95	124396	651365.3	642990.4	131873.1	129327.8
spades-all-contigs	SCAFFMATCH	4613207	1774105	50	174666	1699492.5	1686030.6	189049.6	187116.3
spades-all-scaffolds	SCAFFMATCH	4621854	1124039	42	182565	1384737.3	1376226.5	251140.6	248550.1
spades-short-contigs	SCAFFMATCH	4592322	1145590	80	129244	937843.5	925706.6	144764.0	142230.3
spades-short-scaffolds	SCAFFMATCH	4593848	1145969	82	132750	938015.6	926113.3	145049.3	142510.1
TOTAL	SCAFFMATCH	32278321	8573379	611	917202	8465645.0	8380791.0	1094013.0	1077506.0
AVERAGE	SCAFFMATCH	4611188.7	1224768.4	87.3	131028.9	1209377.8	1197255.9	156287.6	153929.5
minia-short-contigs	SOPRA	4592656	24068	3	23921	31589.2	30894.1	31255.0	30563.3
minia-short-contigs-multik	SOPRA	4592868	60917	1	60584	77153.6	75729.1	76820.3	75401.0
velvet-short-scaffolds	SOPRA	4565312	132652	10	105804	143180.3	140379.9	119847.5	117458.0
spades-all-contigs	SOPRA	4602497	204692	11	173122	227721.5	225315.7	171401.8	169590.4
spades-all-scaffolds	SOPRA	4611416	501306	19	182565	565765.3	560875.8	251100.4	248448.5
spades-short-contigs	SOPRA	4571108	124282	9	108018	135657.0	133209.4	128876.2	126550.3
spades-short-scaffolds	SOPRA	4571477	133189	10	112394	146466.5	143835.5	132730.7	130345.8
TOTAL	SOPRA	32107334	1181106	63	766408	1327533.0	1310240.0	912032.0	898357.0
AVERAGE	SOPRA	4586762.0	168729.4	9.0	109486.9	189647.6	187177.1	130290.3	128336.8
minia-short-contigs	SSPACE	4592641	24068	1	23921	31481.7	30788.8	31255.0	30563.3
minia-short-contigs-multik	SSPACE	4592789	62442	1	60584	79789.7	78315.2	79456.3	77987.0
velvet-short-scaffolds	SSPACE	4565307	132652	9	105804	143158.4	140358.3	119847.5	117458.0
spades-all-contigs	SSPACE	4602497	204692	11	173122	227721.5	225315.7	171401.8	169590.4
spades-all-scaffolds	SSPACE	4611416	501306	19	182565	565765.3	560875.8	251100.4	248448.5
spades-short-contigs	SSPACE	4571108	124282	9	108018	135657	133209.4	128876.2	126550.3
spades-short-scaffolds	SSPACE	4571477	133189	10	112394	146466.5	143835.5	132730.7	130345.8
TOTAL	SSPACE	32107235	1182631	60	766408	1330040.0	1312699.0	914668.0	900943.0
AVERAGE	SSPACE	4586747.9	168947.3	8.6	109486.9	190005.7	187528.4	130666.8	128706.2
minia-short-contigs	BESST	4683175	4620676	139	82941	4599724.7	4602463.4	106994.6	104860.8
minia-short-contigs-multik	BESST	4654714	1826234	84	129087	1875544.6	1870113.6	145489.9	143016.3
velvet-short-scaffolds	BESST	4639918	3631228	78	132667	2957518.0	2950610.9	158003.7	155017.2
spades-all-contigs	BESST	4623001	925476	45	174666	890127.4	885340.5	183833.5	182004.3
spades-all-scaffolds	BESST	4628480	1124983	34	196841	1350375.9	1344253.6	274321.8	271536.4
spades-short-contigs	BESST	4625605	837523	67	133189	1041996.0	1036799.0	158591.7	155894.2
spades-short-scaffolds	BESST	4626155	837614	66	153759	1041736.6	1036507.5	160123.7	157399.9
TOTAL	BESST	32481048	13803734	513	1003150	13757023.0	13726088.0	1187359.0	1169729.0
AVERAGE	BESST	4640149.7	1971962.0	73.3	143307.1	1965289.0	1960869.8	169622.7	167104.2
minia-short-contigs	ORIGINAL	4592471	23921	0	23921	31255.1	30566.1	31255.0	30563.3
minia-short-contigs-multik	ORIGINAL	4592868	60917	1	60584	77153.6	75729.1	76820.3	75401.0
velvet-short-scaffolds	ORIGINAL	4565307	132652	9	105804	143158.4	140358.3	119847.5	117458.0
spades-all-contigs	ORIGINAL	4602497	204692	11	173122	227721.5	225315.7	171401.8	169590.4
spades-all-scaffolds	ORIGINAL	4611416	501306	19	182565	565765.3	560875.8	251100.4	248448.5
spades-short-contigs	ORIGINAL	4571108	124282	9	108018	135657.0	133209.4	128876.2	126550.3
spades-short-scaffolds	ORIGINAL	4571477	133189	10	112394	146466.5	143835.5	132730.7	130345.8
TOTAL	ORIGINAL	32107144	1180959	59	766408	1327177.0	1309890.0	912032.0	898357.0
AVERAGE	ORIGINAL	4586734.9	168708.4	8.4	109486.9	189596.8	187127.1	130290.3	128336.8

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4638206.3	1970870.3	68.0	143818.1	1963949.6	1958284.1	171725.9	169169.0
OPERA	4592883.1	475548.1	36.7	130296.1	449920.0	443800.7	154760.5	152352.5
SCARPA	4593740.7	181044.3	22.0	111347.4	207023.6	204449.2	132257.4	130248.7
SCAFFMATCH	4611188.7	1224768.4	87.3	131028.9	1209377.8	1197255.9	156287.6	153929.5
SOPRA	4586762.0	168729.4	9.0	109486.9	189647.6	187177.1	130290.3	128336.8
SSPACE	4586747.9	168947.3	8.6	109486.9	190005.7	187528.4	130666.8	128706.2
BESST	4640149.7	1971962.0	73.3	143307.1	1965289.0	1960869.8	169622.7	167104.2
ORIGINAL	4586734.9	168708.4	8.4	109486.9	189596.8	187127.1	130290.3	128336.8

4.15 Quality indicators: ecoli_wide, N=1000

Table S31

assembly	tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
minia-short-contigs	BESST-v2	4677131	4614632	25	354334	4593680.9	4590430.9	505947.4	495793.3
minia-short-contigs-multik	BESST-v2	4652383	1825286	13	687123	1874396.8	1868027.3	625679.5	614983.4
velvet-short-scaffolds	BESST-v2	4638385	3630578	15	586387	2957328.7	2949444.8	473903.1	464986.8
spades-all-contigs	BESST-v2	4623001	925476	18	204913	890127.4	885340.5	341863.1	338461.5
spades-all-scaffolds	BESST-v2	4628480	1124983	10	356583	1350375.9	1344253.6	524524.4	519198.4
spades-short-contigs	BESST-v2	4623759	837523	13	397767	1040999.3	1035393.0	455963.8	448199.8
spades-short-scaffolds	BESST-v2	4624305	837614	13	397678	1040738.0	1035098.8	455595.6	447837.2
TOTAL	BESST-v2	32467444	13796092	107	2984785	13747647.0	13707989.0	3383477.0	3329460.0
AVERAGE	BESST-v2	4638206.3	1970870.3	15.3	426397.9	1963949.6	1958284.1	483353.8	475637.2
minia-short-contigs	OPERA	4607204	203356	11	174137	236736.9	232270.1	171952.8	168163.3
minia-short-contigs-multik	OPERA	4602349	579774	14	284390	457328.0	449819.0	273933.9	268885.6
velvet-short-scaffolds	OPERA	4580253	689469	22	235214	615714.2	605654.9	258827.9	253689.2
spades-all-contigs	OPERA	4603511	398826	4	286043	510334.5	505054.5	434460.4	429869.9
spades-all-scaffolds	OPERA	4613866	1149028	6	356583	848343.4	841459.9	466352.4	461427.2
spades-short-contigs	OPERA	4571178	134188	3	133189	228128.6	224015.9	164833.1	161858.6
spades-short-scaffolds	OPERA	4571821	174196	4	144138	252854.1	248330.7	176308.1	173140.6
TOTAL	OPERA	32150182	3328837	64	1613694	3149440.0	3106605.0	1946669.0	1917034.0
AVERAGE	OPERA	4592883.1	475548.1	9.1	230527.7	449920.0	443800.7	278095.5	273862.1
minia-short-contigs	SCARPA	4605195	30674	5	30602	36890.9	36181.4	36542.6	35733.0
minia-short-contigs-multik	SCARPA	4600315	97905	6	82922	100101.2	98413.7	95151.5	93384.8
velvet-short-scaffolds	SCARPA	4578439	133437	6	132667	168492.3	165673.7	151791.3	148764.0
spades-all-contigs	SCARPA	4605218	222516	5	191724	237081.9	234716.2	200005.2	197864.3
spades-all-scaffolds	SCARPA	4612683	501306	4	356583	565747.7	561012.9	466393.9	461468.2
spades-short-contigs	SCARPA	4577158	133189	5	132750	163923.3	161179.4	149716.4	146964.3
spades-short-scaffolds	SCARPA	4577177	148283	5	147312	176928.2	173967.3	162760.7	159781.7
TOTAL	SCARPA	32156185	1267310	36	1074560	1449166.0	1431145.0	1262362.0	1243960.0
AVERAGE	SCARPA	4593740.7	181044.3	5.1	153508.6	207023.6	204449.2	180337.4	177708.6
minia-short-contigs	SCAFFMATCH	4641541	1287367	61	174818	1293679.6	1280658.8	208752.4	204425.6
minia-short-contigs-multik	SCAFFMATCH	4622805	1448889	52	206242	1560511.0	1543065.0	215582.6	211790.5
velvet-short-scaffolds	SCAFFMATCH	4592744	647420	44	189149	651365.3	642990.4	240509.1	235867.0
spades-all-contigs	SCAFFMATCH	4613207	1774105	19	651460	1699492.5	1686030.6	539332.7	533817.4
spades-all-scaffolds	SCAFFMATCH	4621854	1124039	16	365417	1384737.3	1376226.5	518931.5	513578.6
spades-short-contigs	SCAFFMATCH	4592322	1145590	33	284835	937843.5	925706.6	282859.9	277909.2
spades-short-scaffolds	SCAFFMATCH	4593848	1145969	35	284835	938015.6	926113.3	282748.8	277799.0
TOTAL	SCAFFMATCH	32278321	8573379	260	2156756	8465645.0	8380791.0	2288717.0	2255187.0
AVERAGE	SCAFFMATCH	4611188.7	1224768.4	37.1	308108.0	1209377.8	1197255.9	326959.6	322169.6
minia-short-contigs	SOPRA	4592656	24068	2	24068	31589.2	30894.1	31479.4	30782.7
minia-short-contigs-multik	SOPRA	4592868	60917	0	60917	77153.6	75729.1	77153.4	75728.0
velvet-short-scaffolds	SOPRA	4565312	132652	2	132652	143180.3	140379.9	139604.6	136821.1
spades-all-contigs	SOPRA	4602497	204692	3	182565	227721.5	225315.7	191174.0	189153.7
spades-all-scaffolds	SOPRA	4611416	501306	4	356583	565765.3	560875.8	466352.4	461427.2
spades-short-contigs	SOPRA	4571108	124282	1	124282	135657.0	133209.4	135508.6	133063.0
spades-short-scaffolds	SOPRA	4571477	133189	1	133189	146466.5	143835.5	146318.2	143689.1
TOTAL	SOPRA	32107334	1181106	13	1014256	1327533.0	1310240.0	1187591.0	1170665.0
AVERAGE	SOPRA	4586762.0	168729.4	1.9	144893.7	189647.6	187177.1	169655.8	167237.8
minia-short-contigs	SSPACE	4592641	24068	0	24068	31481.7	30788.8	31479.4	30782.7
minia-short-contigs-multik	SSPACE	4592789	62442	0	62441	79789.7	78315.2	79789.4	78313.9
velvet-short-scaffolds	SSPACE	4565307	132652	1	132652	143158.4	140358.3	139604.6	136821.1
spades-all-contigs	SSPACE	4602497	204692	3	182565	227721.5	225315.7	191174.0	189153.7
spades-all-scaffolds	SSPACE	4611416	501306	4	356583	565765.3	560875.8	466352.4	461427.2
spades-short-contigs	SSPACE	4571108	124282	1	124282	135657.0	133209.4	135508.6	133063.0
spades-short-scaffolds	SSPACE	4571477	133189	1	133189	146466.5	143835.5	146318.2	143689.1
TOTAL	SSPACE	32107235	1182631	10	1015780	1330040.0	1312699.0	1190227.0	1173251.0
AVERAGE	SSPACE	4586747.9	168947.3	1.4	145111.4	190005.7	187528.4	170032.4	167607.2
minia-short-contigs	BESST	4683175	4620676	44	353047	4599724.7	4602463.4	471697.1	462257.5
minia-short-contigs-multik	BESST	4654714	1826234	17	647087	1875544.6	1870113.6	533442.4	524372.7
velvet-short-scaffolds	BESST	4639918	3631228	21	586387	2957518.0	2950610.9	460640.1	451933.1
spades-all-contigs	BESST	4623001	925476	18	204913	890127.4	885340.5	341863.1	338461.5
spades-all-scaffolds	BESST	4628480	1124983	10	356583	1350375.9	1344253.6	524524.4	519198.4
spades-short-contigs	BESST	4625605	837523	17	397767	1041996.0	1036799.0	439131.3	431662.0
spades-short-scaffolds	BESST	4626155	837614	17	355856	1041736.6	1036507.5	438804.0	431339.6
TOTAL	BESST	32481048.0	13803734	144	2901640	13757023.0	13726088.0	3210102.0	3159225.0
AVERAGE	BESST	4640149.7	1971962.0	20.6	414520.0	1965289.0	1960869.8	458586.1	451317.8
minia-short-contigs	ORIGINAL	4592471	23921	0	23921	31255.1	30566.1	31255.0	30563.3
minia-short-contigs-multik	ORIGINAL	4592868	60917	0	60917	77153.6	75729.1	77153.4	75728.0
velvet-short-scaffolds	ORIGINAL	4565307	132652	1	132652	143158.4	140358.3	139604.6	136821.1
spades-all-contigs	ORIGINAL	4602497	204692	3	182565	227721.5	225315.7	191174.0	189153.7
spades-all-scaffolds	ORIGINAL	4611416	501306	4	356583	565765.3	560875.8	466352.4	461427.2
spades-short-contigs	ORIGINAL	4571108	124282	1	124282	135657.0	133209.4	135508.6	133063.0
spades-short-scaffolds	ORIGINAL	4571477	133189	1	133189	146466.5	143835.5	146318.2	143689.1
TOTAL	ORIGINAL	32107144	1180959	10	1014109	1327177.0	1309890.0	1187366.0	1170445.0
AVERAGE	ORIGINAL	4586734.9	168708.4	1.4	144872.7	189596.8	187127.1	169623.7	167206.5

Summary

tool	assm-size	NG50	misassm	NGA50	E_{assm}	E_{genome}	EA_{assm}	EA_{genome}
BESST-v2	4638206.3	1970870.3	15.3	426397.9	1963949.6	1958284.1	483353.8	475637.2
OPERA	4592883.1	475548.1	9.1	230527.7	449920.0	443800.7	278095.5	273862.1
SCARPA	4593740.7	181044.3	5.1	153508.6	207023.6	204449.2	180337.4	177708.6
SCAFFMATCH	4611188.7	1224768.4	37.1	308108.0	1209377.8	1197255.9	326959.6	322169.6
SOPRA	4586762.0	168729.4	1.9	144893.7	189647.6	187177.1	169655.8	167237.8
SSPACE	4586747.9	168947.3	1.4	145111.4	190005.7	187528.4	170032.4	167607.2
BESST	4640149.7	1971962.0	20.6	414520.0	1965289.0	1960869.8	458586.1	451317.8
ORIGINAL	4586734.9	168708.4	1.4	144872.7	189596.8	187127.1	169623.7	167206.5

5 Runtime and memory

We also measured runtime and peak memory of the tools. Due to the extensive number of experiments (560 scaffolding runs and their evaluations), we limited the run time to 24 hours on two 8 GB cores for each scaffolding experiment. By inspection of the runtime, OPERA and SCAFFMATCH are the only scaffolders making use of multiple cores. As shown before in for example (Sahlin *et al.*, 2014; Hunt *et al.*, 2014), SOPRA is by far the slowest, failing to complete in 24 h on many of the hs14 datasets. SCARPA failed on two of the hs14 datasets, both times on the MSR-CA assembly. BESST, BESST-v2, SSPACE, SCAFFMATCH and OPERA are the fastest scaffolders. SCAFFMATCH provides different algorithms and the default was used on all experiments except for six runs because of time constraints (all SGA and ABySS runs on hs14) which were run with the option "greedy" in the maximal matching algorithm. All scaffolders were timed when calling their main script/binary. This means, *e.g.*, that mapping time is included for SSPACE and SCAFFMATCH, but not for scaffolders that take a BAM file as input like BESST. But adding mapping time to BESST(-v2), SSPACE is the fastest scaffolder in general. However, runtime is not the main objective in this study and we believe that BESST, BESST-v2, SSPACE, OPERA and SCAFFMATCH (with the greedy approach) and have runtimes that should be practical on most genomes. BESST-v2 has been used for scaffolding genomes as large as spruce (Nystedt *et al.*, 2013) in 24 hours (excluding mapping time). We note that there is no big difference in speed between BESST-v2 and BESST, and there is no increased memory demand. BESST-v2 used alignments from BWA-MEM (Li, 2013). SCAFFMATCH is coupled with Bowtie2 (Langmead and Salzberg, 2012), hence it was used in SCAFFMATCH's pipeline. The other scaffolders were given "BWA" as parameter to their respective pipelines.

5.1 sim, c=30

Table S32

tool	user time	wall clock time	peak memory (GB)
BESST-v2	91.32	92.1	0.020
SCARPA	9.28	10.2	0.034
SCAFFMATCH	37.11	30.11	0.054
SOPRA	193.79	196.34	0.023
SSPACE	16.71	22.61	0.032
BESST	33.22	35.2	0.020

5.2 assemblathon3k, c=20

Table S33

tool	user time	wall clock time	peak memory (GB)
BESST-v2	5239.37	5247.0	0.453 028
OPERA	8578.28	10 839.0	0.529 19
SCARPA	223.01	1415.2	1.091 931
SCAFFMATCH	22 359.17	16 711.0	3.373 552
SOPRA	17 392.41	20 160.0	0.957 568
SSPACE	6761.53	6872.0	0.221 675
BESST	3968.21	3972.0	0.453 024
ORIGINAL	0.0	2.81	0.000 243

5.3 staph, c=0

Table S34

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	27.99	28.76	0.024 194
ABySS2	BESST-v2	25.7	26.66	0.025 182
Bambus2	BESST-v2	25.75	26.57	0.025 488
Allpaths-LG	BESST-v2	25.22	26.29	0.026 412
MSR-CA	BESST-v2	25.38	26.37	0.025 804
SGA	BESST-v2	68.5	72.34	0.022 785
SOAPdenovo	BESST-v2	25.99	27.47	0.026 498
Velvet	BESST-v2	25.94	26.72	0.025 257
TOTAL	BESST-v2	250.5	261.2	0.2
AVERAGE	BESST-v2	31.3	32.6	0.0
ABySS	OPERA	942.52	1257.37	0.026 043
ABySS2	OPERA	526.2	801.71	0.025 484
Bambus2	OPERA	635.96	803.61	0.025 168
Allpaths-LG	OPERA	684.04	905.82	0.025 427
MSR-CA	OPERA	583.37	703.25	0.025 214
SGA	OPERA	625.35	993.34	0.043 897
SOAPdenovo	OPERA	599.14	710.97	0.025 237
Velvet	OPERA	610.38	636.62	0.025 034
TOTAL	OPERA	5207.0	6812.7	0.2
AVERAGE	OPERA	650.9	851.6	0.0
ABySS	SCARPA	237.28	296.52	0.064 037
ABySS2	SCARPA	79.67	386.02	0.059 775
Bambus2	SCARPA	65.97	91.42	0.057 711
Allpaths-LG	SCARPA	60.04	131.95	0.056 54
MSR-CA	SCARPA	78.22	132.73	0.057 494
SGA	SCARPA	3102.78	3135.4	0.094 159
SOAPdenovo	SCARPA	71.93	410.84	0.057 895
Velvet	SCARPA	13.98	185.55	0.036 598
TOTAL	SCARPA	3709.9	4770.4	0.5
AVERAGE	SCARPA	463.7	596.3	0.1
ABySS	SCAFFMATCH	698.38	381.22	0.483 902
ABySS2	SCAFFMATCH	228.61	132.78	0.319 133
Bambus2	SCAFFMATCH	207.69	119.1	0.256 542
Allpaths-LG	SCAFFMATCH	204.78	118.4	0.264 368
MSR-CA	SCAFFMATCH	205.74	116.32	0.272 379
SGA	SCAFFMATCH	264.23	177.05	0.313 296
SOAPdenovo	SCAFFMATCH	190.6	114.06	0.269 02
Velvet	SCAFFMATCH	191.66	115.31	0.261 478
TOTAL	SCAFFMATCH	2191.7	1274.2	2.4
AVERAGE	SCAFFMATCH	274.0	159.3	0.3
ABySS	SOPRA	234.28	263.63	0.031 258
ABySS2	SOPRA	234.12	244.65	0.034 735
Bambus2	SOPRA	525.33	557.34	0.025 146
Allpaths-LG	SOPRA	168.28	201.99	0.037 114
MSR-CA	SOPRA	595.24	618.75	0.056 198
SGA	SOPRA	913.68	970.57	0.057 025
SOAPdenovo	SOPRA	604.04	620.89	0.040 517
Velvet	SOPRA	937.66	953.68	0.067 346
TOTAL	SOPRA	4212.6	4431.5	0.3
AVERAGE	SOPRA	526.6	553.9	0.0
ABySS	SSPACE	28.39	40.97	0.024 408
ABySS2	SSPACE	15.41	21.56	0.023 441
Bambus2	SSPACE	16.46	20.05	0.023 484
Allpaths-LG	SSPACE	13.72	17.0	0.023 36
MSR-CA	SSPACE	16.21	19.24	0.023 564
SGA	SSPACE	36.79	42.81	0.025 346
SOAPdenovo	SSPACE	13.48	40.3	0.023 302
Velvet	SSPACE	17.81	23.27	0.023 674
TOTAL	SSPACE	158.3	225.2	0.2
AVERAGE	SSPACE	19.8	28.2	0.0
ABySS	BESST	27.32	28.09	0.024 193
ABySS2	BESST	24.55	25.83	0.025 185
Bambus2	BESST	25.25	32.43	0.025 49
Allpaths-LG	BESST	24.82	26.18	0.026 412
MSR-CA	BESST	25.76	26.64	0.025 806
SGA	BESST	70.68	76.25	0.022 794
SOAPdenovo	BESST	26.38	27.28	0.026 499
Velvet	BESST	25.89	26.88	0.025 257
TOTAL	BESST	250.6	269.6	0.2
AVERAGE	BESST	31.3	33.7	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	31.3	32.6	0.0
OPERA	650.9	851.6	0.0
SCARPA	463.7	596.3	0.1
SCAFFMATCH	274.0	159.3	0.3
SOPRA	526.6	553.9	0.0
SSPACE	19.8	28.2	0.0
BESST	31.3	33.7	0.0

5.4 staph, c=15

Table S35

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	144.65	145.74	0.025 025
ABySS2	BESST-v2	28.17	28.93	0.025 189
Bambus2	BESST-v2	28.4	29.5	0.025 488
Allpaths-LG	BESST-v2	28.9	29.81	0.026 415
MSR-CA	BESST-v2	27.98	29.08	0.025 805
SGA	BESST-v2	384.34	389.76	0.058 276
SOAPdenovo	BESST-v2	39.32	48.62	0.026 501
Velvet	BESST-v2	45.21	55.02	0.025 257
TOTAL	BESST-v2	727.0	756.5	0.2
AVERAGE	BESST-v2	90.9	94.6	0.0
ABySS	OPERA	1058.67	1493.06	0.026 043
ABySS2	OPERA	616.04	638.45	0.025 485
Bambus2	OPERA	740.94	1200.69	0.025 169
Allpaths-LG	OPERA	746.24	974.27	0.025 425
MSR-CA	OPERA	737.77	771.69	0.025 215
SGA	OPERA	2554.77	2831.65	0.046 053
SOAPdenovo	OPERA	715.85	752.88	0.025 238
Velvet	OPERA	759.49	987.81	0.025 034
TOTAL	OPERA	7929.8	9650.5	0.2
AVERAGE	OPERA	991.2	1206.3	0.0
ABySS	SCARPA	54.8	591.12	0.046 577
ABySS2	SCARPA	72.72	123.07	0.062 354
Bambus2	SCARPA	71.21	80.48	0.062 536
Allpaths-LG	SCARPA	75.61	107.63	0.062 191
MSR-CA	SCARPA	73.48	126.0	0.062 346
SGA	SCARPA	2301.91	2740.68	0.117 097
SOAPdenovo	SCARPA	66.69	441.76	0.063 544
Velvet	SCARPA	147.67	183.62	0.063 287
TOTAL	SCARPA	2864.1	4394.4	0.5
AVERAGE	SCARPA	358.0	549.3	0.1
ABySS	SCAFFMATCH	731.69	392.96	0.564 292
ABySS2	SCAFFMATCH	282.6	157.42	0.405 607
Bambus2	SCAFFMATCH	256.76	146.29	0.317 497
Allpaths-LG	SCAFFMATCH	243.6	137.1	0.330 162
MSR-CA	SCAFFMATCH	259.49	144.97	0.339 665
SGA	SCAFFMATCH	302.59	199.2	0.359 42
SOAPdenovo	SCAFFMATCH	245.42	139.74	0.335 922
Velvet	SCAFFMATCH	258.34	145.92	0.325 624
TOTAL	SCAFFMATCH	2580.5	1463.6	3.0
AVERAGE	SCAFFMATCH	322.6	183.0	0.4
ABySS	SOPRA	452.01	489.45	0.045 429
ABySS2	SOPRA	288.62	301.11	0.0344
Bambus2	SOPRA	533.25	551.47	0.026 967
Allpaths-LG	SOPRA	213.59	232.59	0.037 104
MSR-CA	SOPRA	506.09	522.13	0.039 84
SGA	SOPRA	7254.9	7292.0	0.124 971
SOAPdenovo	SOPRA	724.84	743.15	0.031 941
Velvet	SOPRA	1033.59	1067.43	0.052 334
TOTAL	SOPRA	11 006.9	11 199.3	0.4
AVERAGE	SOPRA	1375.9	1399.9	0.0
ABySS	SSPACE	36.69	43.65	0.024 408
ABySS2	SSPACE	19.56	26.35	0.023 441
Bambus2	SSPACE	22.15	34.24	0.023 484
Allpaths-LG	SSPACE	18.96	26.66	0.023 36
MSR-CA	SSPACE	21.06	26.79	0.023 564
SGA	SSPACE	54.44	72.96	0.050 186
SOAPdenovo	SSPACE	16.6	24.19	0.023 303
Velvet	SSPACE	23.47	56.08	0.023 674
TOTAL	SSPACE	212.9	310.9	0.2
AVERAGE	SSPACE	26.6	38.9	0.0
ABySS	BESST	83.38	84.25	0.025 026
ABySS2	BESST	25.97	27.45	0.025 188
Bambus2	BESST	28.65	29.28	0.025 49
Allpaths-LG	BESST	28.47	29.44	0.026 41
MSR-CA	BESST	28.26	29.29	0.025 808
SGA	BESST	339.31	340.89	0.058 28
SOAPdenovo	BESST	36.68	38.67	0.0265
Velvet	BESST	41.2	42.65	0.025 26
TOTAL	BESST	611.9	621.9	0.2
AVERAGE	BESST	76.5	77.7	0.0
ABySS	ORIGINAL	0.0	0.08	0.000 243
ABySS2	ORIGINAL	0.0	0.15	0.000 243
Bambus2	ORIGINAL	0.0	0.16	0.000 242
Allpaths-LG	ORIGINAL	0.0	0.15	0.000 243
MSR-CA	ORIGINAL	0.0	0.17	0.000 243
SGA	ORIGINAL	0.0	0.15	0.000 243
SOAPdenovo	ORIGINAL	0.0	0.15	0.000 243
Velvet	ORIGINAL	0.0	0.13	0.000 242
TOTAL	ORIGINAL	0.0	1.1	0.0
AVERAGE	ORIGINAL	0.0	0.1	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	90.9	94.6	0.0
OPERA	991.2	1206.3	0.0
SCARPA	358.0	549.3	0.1
SCAFFMATCH	322.6	183.0	0.4
SOPRA	1375.9	1399.9	0.0
SSPACE	26.6	38.9	0.0
BESST	76.5	77.7	0.0
ORIGINAL	0.0	0.1	0.0

5.5 staph, c=40

Table S36

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	225.39	235.69	0.025 815
ABySS2	BESST-v2	38.0	39.23	0.025 192
Bambus2	BESST-v2	35.29	39.85	0.025 494
Allpaths-LG	BESST-v2	35.89	37.49	0.026 501
MSR-CA	BESST-v2	34.78	35.78	0.025 812
SGA	BESST-v2	677.57	678.76	0.040 111
SOAPdenovo	BESST-v2	44.46	63.27	0.026 505
Velvet	BESST-v2	57.77	60.38	0.025 266
TOTAL	BESST-v2	1149.2	1190.5	0.2
AVERAGE	BESST-v2	143.6	148.8	0.0
ABySS	OPERA	1305.75	1733.77	0.026 044
ABySS2	OPERA	861.97	932.83	0.025 485
Bambus2	OPERA	1101.21	1351.25	0.025 169
Allpaths-LG	OPERA	1025.78	1482.87	0.025 426
MSR-CA	OPERA	1106.76	1624.53	0.025 214
SGA	OPERA	1779.29	2210.2	0.054 157
SOAPdenovo	OPERA	1019.26	1076.64	0.025 238
Velvet	OPERA	1094.27	1511.27	0.025 034
TOTAL	OPERA	9294.3	11 923.4	0.2
AVERAGE	OPERA	1161.8	1490.4	0.0
ABySS	SCARPA	124.44	574.17	0.082 739
ABySS2	SCARPA	10.36	122.16	0.026 516
Bambus2	SCARPA	103.39	139.12	0.076 878
Allpaths-LG	SCARPA	96.31	534.96	0.072 364
SGA	SCARPA	4232.27	4240.0	0.147 952
SOAPdenovo	SCARPA	101.03	187.53	0.077 059
Velvet	SCARPA	113.89	167.02	0.082 815
TOTAL	SCARPA	4781.7	5965.0	0.6
AVERAGE	SCARPA	683.1	852.1	0.1
ABySS	SCAFFMATCH	854.74	459.5	0.752 199
ABySS2	SCAFFMATCH	427.51	236.92	0.607 92
Bambus2	SCAFFMATCH	358.21	200.34	0.460 261
Allpaths-LG	SCAFFMATCH	351.7	197.45	0.484 649
MSR-CA	SCAFFMATCH	370.71	205.92	0.497 064
SGA	SCAFFMATCH	448.15	280.52	0.513 997
SOAPdenovo	SCAFFMATCH	378.92	211.52	0.492 248
Velvet	SCAFFMATCH	372.8	208.17	0.475 28
TOTAL	SCAFFMATCH	3562.7	2000.3	4.3
AVERAGE	SCAFFMATCH	445.3	250.0	0.5
ABySS	SOPRA	1013.55	1068.11	0.036 873
ABySS2	SOPRA	385.03	407.77	0.033 591
Bambus2	SOPRA	731.65	779.92	0.026 566
Allpaths-LG	SOPRA	324.18	350.89	0.036 131
MSR-CA	SOPRA	710.17	732.16	0.039 161
SGA	SOPRA	8780.35	8852.0	0.061 286
SOAPdenovo	SOPRA	820.28	840.14	0.026 793
Velvet	SOPRA	1110.49	1139.58	0.037 343
TOTAL	SOPRA	13 875.7	14 170.6	0.3
AVERAGE	SOPRA	1734.5	1771.3	0.0
ABySS	SSPACE	53.86	61.04	0.052 953
ABySS2	SSPACE	29.01	96.95	0.023 439
Bambus2	SSPACE	35.64	84.29	0.032 274
Allpaths-LG	SSPACE	25.85	34.81	0.023 36
MSR-CA	SSPACE	33.47	49.93	0.028 327
SGA	SSPACE	92.83	132.46	0.120 643
SOAPdenovo	SSPACE	24.39	30.95	0.023 302
Velvet	SSPACE	38.02	48.19	0.035 984
TOTAL	SSPACE	333.1	538.6	0.3
AVERAGE	SSPACE	41.6	67.3	0.0
ABySS	BESST	191.55	192.63	0.025 813
ABySS2	BESST	34.85	35.85	0.025 192
Bambus2	BESST	35.72	36.86	0.025 498
Allpaths-LG	BESST	34.05	34.75	0.0265
MSR-CA	BESST	37.4	39.07	0.025 813
SGA	BESST	642.68	651.44	0.040 119
SOAPdenovo	BESST	45.74	65.28	0.026 503
Velvet	BESST	47.35	50.03	0.025 267
TOTAL	BESST	1069.3	1105.9	0.2
AVERAGE	BESST	133.7	138.2	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	143.6	148.8	0.0
OPERA	1161.8	1490.4	0.0
SCARPA	683.1	852.1	0.1
SCAFFMATCH	445.3	250.0	0.5
SOPRA	1734.5	1771.3	0.0
SSPACE	41.6	67.3	0.0
BESST	133.7	138.2	0.0

5.6 rhodo, c=0

Table S37

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	58.56	59.74	0.024 992
ABySS2	BESST-v2	28.07	28.91	0.020 966
Bambus2	BESST-v2	22.09	22.82	0.021 08
Allpaths-LG	BESST-v2	26.99	28.14	0.022 303
CABOG	BESST-v2	24.02	25.52	0.019 522
MSR-CA	BESST-v2	26.16	27.03	0.020 658
SGA	BESST-v2	437.6	439.72	0.031 986
SOAPdenovo	BESST-v2	25.56	26.64	0.022 676
Velvet	BESST-v2	28.62	29.67	0.020 435
TOTAL	BESST-v2	677.7	688.2	0.2
AVERAGE	BESST-v2	75.3	76.5	0.0
ABySS	OPERA	387.17	687.77	0.027 106
ABySS2	OPERA	417.66	783.93	0.027 452
Bambus2	OPERA	392.97	507.65	0.026 591
Allpaths-LG	OPERA	392.42	583.18	0.026 525
CABOG	OPERA	387.9	583.48	0.026 193
MSR-CA	OPERA	441.65	869.79	0.026 407
SGA	OPERA	415.64	757.72	0.026 859
SOAPdenovo	OPERA	421.16	443.57	0.026 811
Velvet	OPERA	431.68	688.23	0.026 852
TOTAL	OPERA	3688.2	5905.3	0.2
AVERAGE	OPERA	409.8	656.1	0.0
ABySS	SCARPA	67.03	145.06	0.049 37
ABySS2	SCARPA	57.14	96.22	0.049 227
Bambus2	SCARPA	46.05	280.75	0.043 233
Allpaths-LG	SCARPA	49.17	113.08	0.043 235
CABOG	SCARPA	47.71	283.04	0.049 205
MSR-CA	SCARPA	56.15	492.33	0.049 205
SGA	SCARPA	64.33	165.81	0.050 831
SOAPdenovo	SCARPA	43.7	59.79	0.049 269
Velvet	SCARPA	9.38	155.9	0.033 235
TOTAL	SCARPA	440.7	1792.0	0.4
AVERAGE	SCARPA	49.0	199.1	0.0
ABySS	SCAFFMATCH	376.91	161.74	0.347 18
ABySS2	SCAFFMATCH	335.86	133.77	0.346 267
Bambus2	SCAFFMATCH	303.24	127.57	0.265 363
Allpaths-LG	SCAFFMATCH	313.66	151.41	0.283 377
CABOG	SCAFFMATCH	262.95	109.73	0.264 54
MSR-CA	SCAFFMATCH	315.35	123.72	0.284 768
SGA	SCAFFMATCH	360.95	217.75	0.278 298
SOAPdenovo	SCAFFMATCH	307.97	148.88	0.279 485
Velvet	SCAFFMATCH	322.61	127.64	0.273 06
TOTAL	SCAFFMATCH	2899.5	1302.2	2.6
AVERAGE	SCAFFMATCH	322.2	144.7	0.3
ABySS	SOPRA	128.17	143.52	0.027 082
ABySS2	SOPRA	89.06	101.41	0.027 43
Bambus2	SOPRA	79.52	95.84	0.026 561
Allpaths-LG	SOPRA	93.69	109.37	0.026 502
CABOG	SOPRA	78.54	87.3	0.026 17
MSR-CA	SOPRA	88.08	96.43	0.026 387
SGA	SOPRA	103.7	125.6	0.026 824
SOAPdenovo	SOPRA	90.41	101.76	0.026 788
Velvet	SOPRA	86.25	99.03	0.026 83
TOTAL	SOPRA	837.4	960.3	0.2
AVERAGE	SOPRA	93.0	106.7	0.0
ABySS	SSPACE	27.19	45.5	0.026 595
ABySS2	SSPACE	23.28	67.32	0.025 555
Bambus2	SSPACE	16.32	26.55	0.023 726
Allpaths-LG	SSPACE	16.96	29.59	0.024 23
CABOG	SSPACE	16.58	28.79	0.024 711
MSR-CA	SSPACE	19.57	43.69	0.024 844
SGA	SSPACE	28.42	47.29	0.026 579
SOAPdenovo	SSPACE	15.3	19.47	0.023 612
Velvet	SSPACE	20.78	26.92	0.025 187
TOTAL	SSPACE	184.4	335.1	0.2
AVERAGE	SSPACE	20.5	37.2	0.0
ABySS	BESST	54.04	55.12	0.024 99
ABySS2	BESST	26.19	26.96	0.020 968
Bambus2	BESST	23.83	24.63	0.021 08
Allpaths-LG	BESST	26.65	27.43	0.022 304
CABOG	BESST	24.62	26.15	0.019 52
MSR-CA	BESST	26.04	26.93	0.020 658
SGA	BESST	408.69	409.48	0.031 985
SOAPdenovo	BESST	23.82	25.05	0.022 678
Velvet	BESST	28.74	29.68	0.020 433
TOTAL	BESST	642.6	651.4	0.2
AVERAGE	BESST	71.4	72.4	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	75.3	76.5	0.0
OPERA	409.8	656.1	0.0
SCARPA	49.0	199.1	0.0
SCAFFMATCH	322.2	144.7	0.3
SOPRA	93.0	106.7	0.0
SSPACE	20.5	37.2	0.0
BESST	71.4	72.4	0.0

5.7 rhodo, c=15

Table S38

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	472.26	473.28	0.058 374
ABySS2	BESST-v2	31.15	32.54	0.021 101
Bambus2	BESST-v2	26.17	27.45	0.021 824
Allpaths-LG	BESST-v2	27.6	28.45	0.022 85
CABOG	BESST-v2	26.85	28.66	0.021 041
MSR-CA	BESST-v2	29.9	31.82	0.021 394
SGA	BESST-v2	667.01	668.8	0.049 149
SOAPdenovo	BESST-v2	27.83	31.12	0.022 731
Velvet	BESST-v2	30.26	35.5	0.020 91
TOTAL	BESST-v2	1339.0	1357.6	0.3
AVERAGE	BESST-v2	148.8	150.8	0.0
ABySS	OPERA	521.8	1059.8	0.027 106
ABySS2	OPERA	513.62	545.15	0.027 453
Bambus2	OPERA	517.49	639.94	0.026 59
Allpaths-LG	OPERA	500.21	888.49	0.026 524
CABOG	OPERA	465.87	488.29	0.026 192
MSR-CA	OPERA	533.41	841.07	0.026 408
SGA	OPERA	533.75	947.48	0.026 859
SOAPdenovo	OPERA	489.32	515.16	0.026 81
Velvet	OPERA	525.39	846.57	0.026 851
TOTAL	OPERA	4600.9	6771.9	0.2
AVERAGE	OPERA	511.2	752.4	0.0
ABySS	SCARPA	85.01	198.34	0.053 183
ABySS2	SCARPA	61.17	121.13	0.052 775
Bambus2	SCARPA	54.99	207.17	0.046 602
Allpaths-LG	SCARPA	56.07	112.07	0.046 602
CABOG	SCARPA	8.89	225.07	0.027 239
MSR-CA	SCARPA	56.86	67.83	0.046 618
SGA	SCARPA	140.31	327.93	0.053 406
SOAPdenovo	SCARPA	57.49	509.13	0.046 609
Velvet	SCARPA	56.08	471.48	0.046 64
TOTAL	SCARPA	576.9	2240.2	0.4
AVERAGE	SCARPA	64.1	248.9	0.0
ABySS	SCAFFMATCH	439.19	183.99	0.409 614
ABySS2	SCAFFMATCH	422.32	168.01	0.412 708
Bambus2	SCAFFMATCH	349.41	134.51	0.319 948
Allpaths-LG	SCAFFMATCH	371.55	140.86	0.339 703
CABOG	SCAFFMATCH	337.03	172.99	0.320 504
MSR-CA	SCAFFMATCH	373.17	141.75	0.342 618
SGA	SCAFFMATCH	412.64	194.48	0.335 24
SOAPdenovo	SCAFFMATCH	355.7	137.32	0.338 114
Velvet	SCAFFMATCH	373.0	148.37	0.329 245
TOTAL	SCAFFMATCH	3434.0	1422.3	3.1
AVERAGE	SCAFFMATCH	381.6	158.0	0.3
ABySS	SOPRA	1559.32	1590.24	0.027 082
ABySS2	SOPRA	420.03	442.86	0.027 431
Bambus2	SOPRA	213.67	227.19	0.026 562
Allpaths-LG	SOPRA	159.22	169.21	0.026 502
CABOG	SOPRA	276.0	287.84	0.026 17
MSR-CA	SOPRA	351.29	366.2	0.026 387
SGA	SOPRA	2651.54	2675.15	0.040 466
SOAPdenovo	SOPRA	189.95	199.44	0.028 08
Velvet	SOPRA	480.3	495.99	0.028 043
TOTAL	SOPRA	6301.3	6454.1	0.3
AVERAGE	SOPRA	700.1	717.1	0.0
ABySS	SSPACE	40.02	53.29	0.034 073
ABySS2	SSPACE	33.2	56.06	0.025 554
Bambus2	SSPACE	20.54	32.61	0.023 725
Allpaths-LG	SSPACE	22.9	36.73	0.024 231
CABOG	SSPACE	26.07	37.04	0.024 711
MSR-CA	SSPACE	26.46	41.3	0.024 843
SGA	SSPACE	41.67	66.74	0.038 513
SOAPdenovo	SSPACE	19.19	26.98	0.023 612
Velvet	SSPACE	31.09	43.19	0.026 293
TOTAL	SSPACE	261.1	393.9	0.2
AVERAGE	SSPACE	29.0	43.8	0.0
ABySS	BESST	396.66	398.06	0.058 378
ABySS2	BESST	30.84	32.16	0.021 104
Bambus2	BESST	26.67	27.73	0.021 822
Allpaths-LG	BESST	27.88	28.81	0.022 85
CABOG	BESST	25.85	26.77	0.021 04
MSR-CA	BESST	28.95	32.42	0.021 395
SGA	BESST	422.34	424.77	0.049 139
SOAPdenovo	BESST	28.37	30.1	0.022 734
Velvet	BESST	29.04	34.34	0.020 911
TOTAL	BESST	1016.6	1035.2	0.3
AVERAGE	BESST	113.0	115.0	0.0
ABySS	ORIGINAL	0.0	0.23	0.000 243
ABySS2	ORIGINAL	0.0	0.45	0.000 244
Bambus2	ORIGINAL	0.0	0.26	0.000 243
Allpaths-LG	ORIGINAL	0.0	0.92	0.000 244
CABOG	ORIGINAL	0.0	0.97	0.000 244
MSR-CA	ORIGINAL	0.0	0.9	0.000 243
SGA	ORIGINAL	0.0	0.09	0.000 244
SOAPdenovo	ORIGINAL	0.0	0.09	0.000 243
Velvet	ORIGINAL	0.0	0.06	0.000 244
TOTAL	ORIGINAL	0.0	4.0	0.0
AVERAGE	ORIGINAL	0.0	0.4	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	148.8	150.8	0.0
OPERA	511.2	752.4	0.0
SCARPA	64.1	248.9	0.0
SCAFFMATCH	381.6	158.0	0.3
SOPRA	700.1	717.1	0.0
SSPACE	29.0	43.8	0.0
BESST	113.0	115.0	0.0
ORIGINAL	0.0	0.4	0.0

5.8 rhodo, c=40

Table S39

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	650.12	652.97	0.045 401
ABySS2	BESST-v2	279.86	280.82	0.023 458
Bambus2	BESST-v2	31.63	32.55	0.023 619
Allpaths-LG	BESST-v2	30.6	31.46	0.024 592
CABOG	BESST-v2	31.14	32.28	0.021 771
MSR-CA	BESST-v2	32.08	32.98	0.023 034
SGA	BESST-v2	724.53	725.11	0.039 33
SOAPdenovo	BESST-v2	32.42	34.26	0.022 815
Velvet	BESST-v2	42.02	43.33	0.022 429
TOTAL	BESST-v2	1854.4	1865.8	0.2
AVERAGE	BESST-v2	206.0	207.3	0.0
ABySS	OPERA	673.31	1453.32	0.027 107
ABySS2	OPERA	746.57	1254.91	0.027 452
Bambus2	OPERA	720.53	1225.54	0.026 59
Allpaths-LG	OPERA	742.63	1405.04	0.026 524
CABOG	OPERA	868.41	1468.12	0.026 191
MSR-CA	OPERA	679.68	714.94	0.026 408
SGA	OPERA	802.98	1432.32	0.026 86
SOAPdenovo	OPERA	793.76	1428.56	0.026 812
Velvet	OPERA	776.59	1087.68	0.026 85
TOTAL	OPERA	6804.5	11 470.4	0.2
AVERAGE	OPERA	756.1	1274.5	0.0
ABySS	SCARPA	148.09	202.03	0.063 294
ABySS2	SCARPA	93.45	452.77	0.060 529
Bambus2	SCARPA	87.19	119.57	0.048 861
Allpaths-LG	SCARPA	51.06	198.43	0.042 894
CABOG	SCARPA	75.41	88.96	0.048 875
MSR-CA	SCARPA	84.32	155.99	0.055 032
SGA	SCARPA	14 451.06	14 582.0	0.078 671
SOAPdenovo	SCARPA	83.75	981.17	0.048 876
Velvet	SCARPA	80.9	146.77	0.055 038
TOTAL	SCARPA	15 155.2	16 927.7	0.5
AVERAGE	SCARPA	1683.9	1880.9	0.1
ABySS	SCAFFMATCH	586.5	242.12	0.553 862
ABySS2	SCAFFMATCH	569.9	217.94	0.567 881
Bambus2	SCAFFMATCH	497.78	188.16	0.448 103
Allpaths-LG	SCAFFMATCH	538.21	208.49	0.471 411
CABOG	SCAFFMATCH	456.77	172.36	0.451 097
MSR-CA	SCAFFMATCH	489.74	240.2	0.477 903
SGA	SCAFFMATCH	604.94	276.28	0.468 231
SOAPdenovo	SCAFFMATCH	491.26	184.68	0.474 978
Velvet	SCAFFMATCH	468.76	183.64	0.460 409
TOTAL	SCAFFMATCH	4703.9	1913.9	4.4
AVERAGE	SCAFFMATCH	522.7	212.7	0.5
ABySS	SOPRA	2444.42	2496.84	0.036 311
ABySS2	SOPRA	969.89	997.25	0.030 197
Bambus2	SOPRA	264.36	279.47	0.026 562
Allpaths-LG	SOPRA	268.38	296.85	0.026 502
CABOG	SOPRA	454.42	510.22	0.026 17
MSR-CA	SOPRA	541.08	557.6	0.028 473
SGA	SOPRA	3430.6	3498.13	0.056 666
SOAPdenovo	SOPRA	295.17	313.6	0.028 365
Velvet	SOPRA	699.76	714.58	0.032 103
TOTAL	SOPRA	9368.1	9664.5	0.3
AVERAGE	SOPRA	1040.9	1073.8	0.0
ABySS	SSPACE	67.1	84.43	0.100 431
ABySS2	SSPACE	54.67	97.13	0.074 758
Bambus2	SSPACE	30.03	55.46	0.027 809
Allpaths-LG	SSPACE	36.14	58.54	0.043 541
CABOG	SSPACE	43.61	54.25	0.065 353
MSR-CA	SSPACE	45.41	71.88	0.067 827
SGA	SSPACE	69.1	87.34	0.120 46
SOAPdenovo	SSPACE	27.06	33.16	0.023 612
Velvet	SSPACE	51.5	70.67	0.081 144
TOTAL	SSPACE	424.6	612.9	0.6
AVERAGE	SSPACE	47.2	68.1	0.1
ABySS	BESST	507.45	508.17	0.045 396
ABySS2	BESST	278.98	279.84	0.023 459
Bambus2	BESST	29.9	31.24	0.023 618
Allpaths-LG	BESST	32.23	33.08	0.024 592
CABOG	BESST	31.08	31.8	0.021 77
MSR-CA	BESST	34.49	35.73	0.023 034
SGA	BESST	491.01	492.18	0.039 319
SOAPdenovo	BESST	31.99	32.78	0.022 815
Velvet	BESST	38.06	38.92	0.022 43
TOTAL	BESST	1475.2	1483.7	0.2
AVERAGE	BESST	163.9	164.9	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	206.0	207.3	0.0
OPERA	756.1	1274.5	0.0
SCARPA	1683.9	1880.9	0.1
SCAFFMATCH	522.7	212.7	0.5
SOPRA	1040.9	1073.8	0.0
SSPACE	47.2	68.1	0.1
BESST	163.9	164.9	0.0

5.9 rhodo_wide

Table S40

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	814.5	815.91	0.038312
ABySS2	BESST-v2	34.51	35.59	0.02582
Bambus2	BESST-v2	26.78	27.7	0.025282
Allpaths-LG	BESST-v2	30.56	31.28	0.027454
CABOG	BESST-v2	30.12	30.91	0.022903
MSR-CA	BESST-v2	32.57	33.02	0.025323
SGA	BESST-v2	253.51	254.34	0.042509
SOAPdenovo	BESST-v2	30.5	31.42	0.027683
Velvet	BESST-v2	34.35	35.01	0.025269
TOTAL	BESST-v2	1287.4	1295.2	0.3
AVERAGE	BESST-v2	143.0	143.9	0.0
ABySS	OPERA	587.72	911.02	0.027107
ABySS2	OPERA	642.17	1067.84	0.027452
Bambus2	OPERA	635.43	1094.59	0.02659
Allpaths-LG	OPERA	615.78	704.62	0.026524
CABOG	OPERA	578.73	1062.67	0.026191
MSR-CA	OPERA	638.13	1065.87	0.026409
SGA	OPERA	658.92	1226.09	0.02686
SOAPdenovo	OPERA	636.91	1176.07	0.02681
Velvet	OPERA	641.49	857.8	0.02685
TOTAL	OPERA	5635.3	9166.6	0.2
AVERAGE	OPERA	626.1	1018.5	0.0
ABySS	SCARPA	68.67	386.15	0.057324
ABySS2	SCARPA	17.05	108.42	0.027425
Bambus2	SCARPA	59.91	205.73	0.059052
Allpaths-LG	SCARPA	61.81	149.33	0.053112
CABOG	SCARPA	62.74	116.26	0.059069
MSR-CA	SCARPA	66.87	594.98	0.059078
SGA	SCARPA	73.18	621.2	0.061076
SOAPdenovo	SCARPA	63.91	117.14	0.05948
Velvet	SCARPA	72.88	84.97	0.060611
TOTAL	SCARPA	547.0	2384.2	0.5
AVERAGE	SCARPA	60.8	264.9	0.1
ABySS	SCAFFMATCH	439.49	172.71	0.467095
ABySS2	SCAFFMATCH	423.47	164.28	0.461575
Bambus2	SCAFFMATCH	346.92	141.45	0.362826
Allpaths-LG	SCAFFMATCH	383.13	146.94	0.391194
CABOG	SCAFFMATCH	339.12	132.35	0.361373
MSR-CA	SCAFFMATCH	389.68	148.76	0.393364
SGA	SCAFFMATCH	400.14	159.6	0.374236
SOAPdenovo	SCAFFMATCH	393.43	148.91	0.376519
Velvet	SCAFFMATCH	378.89	146.18	0.371416
TOTAL	SCAFFMATCH	3494.3	1361.2	3.6
AVERAGE	SCAFFMATCH	388.3	151.2	0.4
ABySS	SOPRA	716.08	766.35	0.027083
ABySS2	SOPRA	501.88	526.84	0.02743
Bambus2	SOPRA	387.73	408.14	0.026562
Allpaths-LG	SOPRA	397.1	428.8	0.026503
CABOG	SOPRA	486.53	523.86	0.02617
MSR-CA	SOPRA	489.55	503.79	0.026386
SGA	SOPRA	818.33	871.64	0.026823
SOAPdenovo	SOPRA	240.37	258.19	0.026787
Velvet	SOPRA	722.74	740.0	0.02683
TOTAL	SOPRA	4760.3	5027.6	0.2
AVERAGE	SOPRA	528.9	558.6	0.0
ABySS	SSPACE	31.72	70.16	0.02627
ABySS2	SSPACE	29.9	44.72	0.025709
Bambus2	SSPACE	22.46	29.03	0.023724
Allpaths-LG	SSPACE	22.6	27.53	0.024174
CABOG	SSPACE	22.29	34.47	0.024831
MSR-CA	SSPACE	24.32	33.44	0.024841
SGA	SSPACE	34.37	50.91	0.026111
SOAPdenovo	SSPACE	19.92	25.44	0.02361
Velvet	SSPACE	27.51	36.69	0.025312
TOTAL	SSPACE	235.1	352.4	0.2
AVERAGE	SSPACE	26.1	39.2	0.0
ABySS	BESST	773.63	778.63	0.038313
ABySS2	BESST	34.12	35.32	0.02582
Bambus2	BESST	27.5	29.06	0.025281
Allpaths-LG	BESST	30.48	31.16	0.027454
CABOG	BESST	29.37	39.13	0.022903
MSR-CA	BESST	32.15	32.9	0.025321
SGA	BESST	250.23	251.3	0.042509
SOAPdenovo	BESST	29.06	42.01	0.027681
Velvet	BESST	35.09	36.27	0.025271
TOTAL	BESST	1241.6	1275.8	0.3
AVERAGE	BESST	138.0	141.8	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	143.0	143.9	0.0
OPERA	626.1	1018.5	0.0
SCARPA	60.8	264.9	0.1
SCAFFMATCH	388.3	151.2	0.4
SOPRA	528.9	558.6	0.0
SSPACE	26.1	39.2	0.0
BESST	138.0	141.8	0.0

5.10 hs14, c=0

Table S41

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	13 632.16	13 654.0	1.001 506
ABySS2	BESST-v2	1389.57	1395.76	0.161 785
Bambus2	BESST-v2	2301.41	2326.88	0.157 664
Allpaths-LG	BESST-v2	247.13	270.74	0.053 37
CABOG	BESST-v2	130.53	155.38	0.053 642
MSR-CA	BESST-v2	546.76	573.48	0.130 583
SGA	BESST-v2	4993.49	5021.0	0.942 092
SOAPdenovo	BESST-v2	3050.95	3077.27	0.118 105
Velvet	BESST-v2	5270.99	5296.0	0.272 135
TOTAL	BESST-v2	31 563.0	31 770.5	2.9
AVERAGE	BESST-v2	3507.0	3530.1	0.3
ABySS	OPERA	9346.94	8005.0	0.228 508
ABySS2	OPERA	9131.3	5745.0	0.114 888
Bambus2	OPERA	8657.77	6877.0	0.156 685
Allpaths-LG	OPERA	8962.45	6563.0	0.058 925
CABOG	OPERA	8765.41	6329.0	0.059 589
SGA	OPERA	10 095.61	6814.0	0.253 84
SOAPdenovo	OPERA	7757.39	6670.0	0.102 986
Velvet	OPERA	14 573.88	11 824.0	0.281 293
TOTAL	OPERA	77 290.8	58 827.0	1.3
AVERAGE	OPERA	9661.3	7353.4	0.2
ABySS	SCARPA	967.87	1093.89	0.260 492
ABySS2	SCARPA	209.22	387.29	0.067 237
Bambus2	SCARPA	103.69	370.35	0.053 818
Allpaths-LG	SCARPA	130.02	218.42	0.058 894
CABOG	SCARPA	968.91	1298.9	0.235 037
MSR-CA	SCARPA	72 965.43	72 989.0	0.427 765
SGA	SCARPA	1193.43	1279.39	0.262 782
SOAPdenovo	SCARPA	177.52	639.61	0.262 315
Velvet	SCARPA	951.04	891.2	0.234 972
TOTAL	SCARPA	77 667.1	79 168.1	1.9
AVERAGE	SCARPA	8629.7	8796.5	0.2
ABySS	SCAFFMATCH	14 587.48	6287.0	3.176 001
ABySS2	SCAFFMATCH	19 168.15	7859.0	4.890 826
Bambus2	SCAFFMATCH	11 051.43	1648.64	4.352 793
Allpaths-LG	SCAFFMATCH	11 351.14	1089.9	4.618 498
CABOG	SCAFFMATCH	11 353.59	1057.91	4.709 553
MSR-CA	SCAFFMATCH	15 219.49	5403.0	4.417 798
SGA	SCAFFMATCH	22 732.96	8898.0	5.129 833
SOAPdenovo	SCAFFMATCH	14 728.61	3807.0	4.827 434
Velvet	SCAFFMATCH	32 535.42	25 126.0	3.019 517
TOTAL	SCAFFMATCH	152 728.3	61 176.4	39.1
AVERAGE	SCAFFMATCH	16 969.8	6797.4	4.3
ABySS2	SOPRA	11 714.44	14 649.0	0.714 251
Bambus2	SOPRA	6935.53	7550.0	0.680 971
Allpaths-LG	SOPRA	2675.68	3013.84	0.642 612
CABOG	SOPRA	3070.71	3452.35	0.739 667
SOAPdenovo	SOPRA	18 398.85	20 520.0	1.243 428
Velvet	SOPRA	20 010.81	24 026.0	0.745 439
TOTAL	SOPRA	62 806.0	73 211.2	4.8
AVERAGE	SOPRA	10 467.7	12 201.9	0.8
ABySS	SSPACE	798.0	997.95	0.245 551
ABySS2	SSPACE	513.77	597.7	0.053 028
Bambus2	SSPACE	442.9	722.55	0.045 995
Allpaths-LG	SSPACE	282.79	508.76	0.043 06
CABOG	SSPACE	284.52	417.82	0.044 122
MSR-CA	SSPACE	586.78	830.56	0.054 144
SGA	SSPACE	1275.62	1607.17	0.288 345
SOAPdenovo	SSPACE	454.67	621.17	0.051 05
Velvet	SSPACE	632.14	806.69	0.075 149
TOTAL	SSPACE	5271.2	7110.4	0.9
AVERAGE	SSPACE	585.7	790.0	0.1
ABySS	BESST	11 188.5	11 216.0	1.001 506
ABySS2	BESST	1124.94	1136.95	0.161 76
Bambus2	BESST	2232.96	2262.34	0.157 66
Allpaths-LG	BESST	237.38	263.78	0.053 371
CABOG	BESST	127.85	154.35	0.053 641
MSR-CA	BESST	532.9	560.31	0.130 584
SGA	BESST	4206.16	4235.0	0.942 09
SOAPdenovo	BESST	3065.1	3092.25	0.118 126
Velvet	BESST	4886.63	4913.0	0.272 131
TOTAL	BESST	27 602.4	27 834.0	2.9
AVERAGE	BESST	3066.9	3092.7	0.3

Summary

assembly	tool	user time	wall clock time	peak memory (GB)
TOTAL	BESST-v2	3507.0	3530.1	0.3
TOTAL	OPERA	9661.3	7353.4	0.2
TOTAL	SCARPA	8629.7	8796.5	0.2
TOTAL	SCAFFMATCH	16 969.8	6797.4	4.3
TOTAL	SOPRA	10 467.7	12 201.9	0.8
TOTAL	SSPACE	585.7	790.0	0.1
TOTAL	BESST	3066.9	3092.7	0.3

5.11 hs14, c=15

Table S42

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	19 500.65	19 525.0	1.291 886
ABySS2	BESST-v2	3204.25	3273.69	0.276 416
Bambus2	BESST-v2	2034.63	2056.65	0.084 813
Allpaths-LG	BESST-v2	223.08	258.0	0.053 369
CABOG	BESST-v2	140.12	166.67	0.053 641
MSR-CA	BESST-v2	664.64	689.45	0.136 703
SGA	BESST-v2	7722.41	7752.0	1.146 404
SOAPdenovo	BESST-v2	4564.87	4588.0	0.160 262
Velvet	BESST-v2	5452.13	5461.0	0.291 525
TOTAL	BESST-v2	43 506.8	43 770.5	3.5
AVERAGE	BESST-v2	4834.1	4863.4	0.4
ABySS	OPERA	9154.95	6369.0	0.229 117
ABySS2	OPERA	11 759.69	8900.0	0.127 52
Bambus2	OPERA	10 016.82	7471.0	0.163 532
Allpaths-LG	OPERA	9081.03	5615.0	0.058 926
CABOG	OPERA	9531.03	5474.0	0.059 589
MSR-CA	OPERA	16 817.81	12 935.0	0.260 457
SGA	OPERA	12 474.87	8487.0	0.253 851
SOAPdenovo	OPERA	10 769.01	8080.0	0.109 815
Velvet	OPERA	10 409.1	7733.0	0.291 322
TOTAL	OPERA	100 014.3	71 064.0	1.6
AVERAGE	OPERA	11 112.7	7896.0	0.2
ABySS	SCARPA	1201.35	1346.14	0.300 525
ABySS2	SCARPA	193.08	625.81	0.191 911
Bambus2	SCARPA	1179.88	1442.21	0.270 722
Allpaths-LG	SCARPA	986.65	1360.05	0.270 437
CABOG	SCARPA	122.9	555.97	0.075 557
MSR-CA	SCARPA	12 859.36	13 504.0	0.163 632
SGA	SCARPA	1329.71	1602.66	0.309 021
SOAPdenovo	SCARPA	1188.31	1493.81	0.271 767
Velvet	SCARPA	1147.1	1280.47	0.275 111
TOTAL	SCARPA	20 208.3	23 211.1	2.1
AVERAGE	SCARPA	2245.4	2579.0	0.2
ABySS	SCAFFMATCH	16 620.07	6465.0	3.756 933
ABySS2	SCAFFMATCH	22 271.81	8219.0	5.886 343
Bambus2	SCAFFMATCH	13 126.44	1819.49	5.244 733
Allpaths-LG	SCAFFMATCH	13 934.42	1284.92	5.582 887
CABOG	SCAFFMATCH	13 679.55	1246.53	5.689 597
MSR-CA	SCAFFMATCH	17 456.69	5515.0	5.286 153
SGA	SCAFFMATCH	26 667.37	9656.0	6.090 304
SOAPdenovo	SCAFFMATCH	17 087.17	3896.0	5.819 985
Velvet	SCAFFMATCH	34 554.33	25 391.0	3.615 225
TOTAL	SCAFFMATCH	175 397.9	63 492.9	47.0
AVERAGE	SCAFFMATCH	19 488.7	7054.8	5.2
ABySS2	SOPRA	20 992.55	24 843.0	1.090 494
Bambus2	SOPRA	16 745.22	17 555.0	1.199 604
Allpaths-LG	SOPRA	3253.69	3806.0	0.677 451
CABOG	SOPRA	3641.45	3984.0	0.781 734
SOAPdenovo	SOPRA	22 160.92	24 998.0	1.395 179
Velvet	SOPRA	27 724.74	32 180.0	1.010 076
TOTAL	SOPRA	94 518.6	107 366.0	6.2
AVERAGE	SOPRA	15 753.1	17 894.3	1.0
ABySS	SSPACE	891.97	1259.59	0.279 031
ABySS2	SSPACE	555.04	838.68	0.096 334
Bambus2	SSPACE	525.12	1006.88	0.085 006
Allpaths-LG	SSPACE	364.18	505.11	0.043 06
CABOG	SSPACE	337.16	571.71	0.042 414
MSR-CA	SSPACE	715.28	912.54	0.125 57
SGA	SSPACE	1223.56	1357.76	0.350 167
SOAPdenovo	SSPACE	693.04	789.54	0.079 176
Velvet	SSPACE	701.42	748.84	0.142 175
TOTAL	SSPACE	6006.8	7990.7	1.2
AVERAGE	SSPACE	667.4	887.9	0.1
ABySS	BESST	15 308.51	15 342.0	1.291 288
ABySS2	BESST	2175.2	2202.13	0.276 353
Bambus2	BESST	1987.25	2026.48	0.084 782
Allpaths-LG	BESST	221.02	249.5	0.053 371
CABOG	BESST	139.49	164.25	0.053 641
MSR-CA	BESST	615.76	647.38	0.136 703
SGA	BESST	5740.14	5770.0	1.162 431
SOAPdenovo	BESST	4150.73	4174.0	0.160 273
Velvet	BESST	4538.73	4583.0	0.291 525
TOTAL	BESST	34 876.8	35 158.7	3.5
AVERAGE	BESST	3875.2	3906.5	0.4
ABySS	ORIGINAL	0.0	5.32	0.000 242
ABySS2	ORIGINAL	0.0	2.64	0.000 243
Bambus2	ORIGINAL	0.0	1.4	0.000 243
Allpaths-LG	ORIGINAL	0.0	9.59	0.000 243
CABOG	ORIGINAL	0.0	2.01	0.000 243
MSR-CA	ORIGINAL	0.0	2.23	0.000 243
SGA	ORIGINAL	0.0	7.46	0.000 244
SOAPdenovo	ORIGINAL	0.0	3.09	0.000 243
Velvet	ORIGINAL	0.0	3.7	0.000 244
TOTAL	ORIGINAL	0.0	37.4	0.0
AVERAGE	ORIGINAL	0.0	4.2	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	4834.1	4863.4	0.4
OPERA	11112.7	7896.0	0.2
SCARPA	2245.4	2579.0	0.2
SCAFFMATCH	19488.7	7054.8	5.2
SOPRA	15753.1	17894.3	1.0
SSPACE	667.4	887.9	0.1
BESST	3875.2	3906.5	0.4
ORIGINAL	0.0	4.2	0.0

5.12 hs14, c=40

Table S43

assembly	tool	user time	wall clock time	peak memory (GB)
ABySS	BESST-v2	19 736.04	19 735.0	1.220 843
ABySS2	BESST-v2	7458.32	7500.0	0.271 18
Bambus2	BESST-v2	357.75	381.41	0.083 418
Allpaths-LG	BESST-v2	295.13	320.85	0.053 447
CABOG	BESST-v2	166.8	196.51	0.053 641
MSR-CA	BESST-v2	432.79	463.42	0.149 468
SGA	BESST-v2	13 145.58	13 178.0	1.417 328
SOAPdenovo	BESST-v2	6256.81	6285.0	0.155 008
Velvet	BESST-v2	1744.82	1800.14	0.321 866
TOTAL	BESST-v2	49 594.0	49 860.3	3.7
AVERAGE	BESST-v2	5510.4	5540.0	0.4
ABySS	OPERA	13 722.14	9199.0	0.229 126
ABySS2	OPERA	15 870.49	11 992.0	0.157 304
Bambus2	OPERA	13 549.0	9576.0	0.191 731
Allpaths-LG	OPERA	12 521.63	8602.0	0.058 924
CABOG	OPERA	14 069.08	9599.0	0.059 59
MSR-CA	OPERA	63 334.37	58 962.0	0.294 423
SGA	OPERA	14 414.99	10 503.0	0.253 835
SOAPdenovo	OPERA	13 664.0	9906.0	0.129 093
Velvet	OPERA	12 676.94	9052.0	0.316 666
TOTAL	OPERA	173 822.6	137 391.0	1.7
AVERAGE	OPERA	19 313.6	15 265.7	0.2
ABySS	SCARPA	1647.77	1664.58	0.393 612
ABySS2	SCARPA	1553.15	2131.14	0.366 306
Bambus2	SCARPA	1246.34	2040.97	0.363 685
Allpaths-LG	SCARPA	1274.66	2019.29	0.363 394
CABOG	SCARPA	1462.0	1574.79	0.363 362
SOAPdenovo	SCARPA	1527.11	1802.57	0.364 729
Velvet	SCARPA	39 859.22	40 028.0	0.388 762
TOTAL	SCARPA	48 570.2	51 261.3	2.6
AVERAGE	SCARPA	6938.6	7323.0	0.4
ABySS	SCAFFMATCH	21 810.13	8234.0	5.116 283
ABySS2	SCAFFMATCH	28 462.14	9089.0	8.210 151
Bambus2	SCAFFMATCH	18 662.62	2324.03	7.330 26
Allpaths-LG	SCAFFMATCH	19 739.05	1733.23	7.831 173
CABOG	SCAFFMATCH	19 051.66	1669.78	7.974 635
MSR-CA	SCAFFMATCH	23 185.71	6432.0	7.310 924
SGA	SCAFFMATCH	36 715.09	13 032.0	8.330 333
SOAPdenovo	SCAFFMATCH	23 443.39	5010.0	8.136 404
Velvet	SCAFFMATCH	41 197.24	28 610.0	5.006 177
TOTAL	SCAFFMATCH	232 267.0	76 134.0	65.2
AVERAGE	SCAFFMATCH	25 807.4	8459.3	7.2
ABySS2	SOPRA	38 230.35	42 976.0	1.466 838
Bambus2	SOPRA	36 584.86	38 145.0	1.702 219
Allpaths-LG	SOPRA	5638.59	6189.0	0.871 761
CABOG	SOPRA	5547.65	6189.0	0.956 294
TOTAL	SOPRA	86 001.4	93 499.0	5.0
AVERAGE	SOPRA	21 500.4	23 374.8	1.2
ABySS	SSPACE	1169.62	1510.72	0.285 237
ABySS2	SSPACE	783.62	967.07	0.105 339
Bambus2	SSPACE	673.21	919.24	0.088 171
Allpaths-LG	SSPACE	475.94	739.27	0.043 06
CABOG	SSPACE	452.53	897.38	0.042 415
MSR-CA	SSPACE	889.36	1046.62	0.131 448
SGA	SSPACE	1603.17	1831.69	0.423 265
SOAPdenovo	SSPACE	668.78	1330.55	0.087 381
Velvet	SSPACE	1042.61	1238.51	0.150 087
TOTAL	SSPACE	7758.8	10 481.0	1.4
AVERAGE	SSPACE	862.1	1164.6	0.2
ABySS	BESST	16 081.54	16 138.0	1.220 471
ABySS2	BESST	6072.29	6081.0	0.271 048
Bambus2	BESST	347.78	372.17	0.083 415
Allpaths-LG	BESST	299.5	326.52	0.053 449
CABOG	BESST	163.6	198.46	0.053 641
MSR-CA	BESST	403.02	430.34	0.149 469
SGA	BESST	8529.83	8556.0	1.416 946
SOAPdenovo	BESST	5390.02	5409.0	0.155 033
Velvet	BESST	1417.69	1442.15	0.321 869
TOTAL	BESST	38 705.3	38 953.6	3.7
AVERAGE	BESST	4300.6	4328.2	0.4

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	5510.4	5540.0	0.4
OPERA	19 313.6	15 265.7	0.2
SCARPA	6938.6	7323.0	0.4
SCAFFMATCH	25 807.4	8459.3	7.2
SOPRA	21 500.4	23 374.8	1.2
SSPACE	862.1	1164.6	0.2
BESST	4300.6	4328.2	0.4

5.13 ecoli_wide

Table S44

assembly	tool	user time	wall clock time	peak memory (GB)
minia-short-contigs	BESST-v2	58.12	66.36	0.022 637
minia-short-contigs-multik	BESST-v2	29.58	30.78	0.024 016
velvet-short-scaffolds	BESST-v2	29.28	30.35	0.024 246
spades-all-contigs	BESST-v2	29.33	30.34	0.024 702
spades-all-scaffolds	BESST-v2	29.03	30.69	0.024 903
spades-short-contigs	BESST-v2	30.77	31.76	0.024 317
spades-short-scaffolds	BESST-v2	30.46	31.3	0.024 345
TOTAL	BESST-v2	236.6	251.6	0.2
AVERAGE	BESST-v2	33.8	35.9	0.0
minia-short-contigs	OPERA	724.38	840.98	0.026 529
minia-short-contigs-multik	OPERA	720.01	1315.38	0.012 76
velvet-short-scaffolds	OPERA	697.07	847.53	0.026 124
spades-all-contigs	OPERA	704.01	790.45	0.026 536
spades-all-scaffolds	OPERA	721.9	985.93	0.026 528
spades-short-contigs	OPERA	731.53	1054.2	0.012 76
spades-short-scaffolds	OPERA	706.74	731.65	0.026 39
TOTAL	OPERA	5005.6	6566.1	0.2
AVERAGE	OPERA	715.1	938.0	0.0
minia-short-contigs	SCARPA	68.51	112.38	0.065 965
minia-short-contigs-multik	SCARPA	63.37	190.12	0.059 781
velvet-short-scaffolds	SCARPA	69.51	156.41	0.059 765
spades-all-contigs	SCARPA	63.77	155.59	0.059 773
spades-all-scaffolds	SCARPA	65.45	76.95	0.059 728
spades-short-contigs	SCARPA	62.75	149.34	0.059 786
spades-short-scaffolds	SCARPA	65.98	156.06	0.059 787
TOTAL	SCARPA	459.3	996.9	0.4
AVERAGE	SCARPA	65.6	142.4	0.1
minia-short-contigs	SCAFFMATCH	406.46	218.63	0.412 554
minia-short-contigs-multik	SCAFFMATCH	361.22	195.07	0.413 522
velvet-short-scaffolds	SCAFFMATCH	389.33	210.17	0.419 171
spades-all-contigs	SCAFFMATCH	383.06	221.02	0.426 227
spades-all-scaffolds	SCAFFMATCH	368.12	200.13	0.426 26
spades-short-contigs	SCAFFMATCH	380.21	205.68	0.420 669
spades-short-scaffolds	SCAFFMATCH	374.68	201.42	0.420 69
TOTAL	SCAFFMATCH	2663.1	1452.1	2.9
AVERAGE	SCAFFMATCH	380.4	207.4	0.4
minia-short-contigs	SOPRA	132.02	153.21	0.026 507
minia-short-contigs-multik	SOPRA	146.98	170.66	0.026 77
velvet-short-scaffolds	SOPRA	127.95	150.41	0.026 099
spades-all-contigs	SOPRA	136.42	149.48	0.026 513
spades-all-scaffolds	SOPRA	132.53	171.04	0.026 506
spades-short-contigs	SOPRA	150.36	170.06	0.026 781
spades-short-scaffolds	SOPRA	135.74	151.85	0.026 366
TOTAL	SOPRA	962.0	1116.7	0.2
AVERAGE	SOPRA	137.4	159.5	0.0
minia-short-contigs	SSPACE	26.49	37.14	0.025 087
minia-short-contigs-multik	SSPACE	22.61	60.09	0.024 011
velvet-short-scaffolds	SSPACE	21.57	31.41	0.023 645
spades-all-contigs	SSPACE	20.24	33.68	0.023 41
spades-all-scaffolds	SSPACE	19.21	25.86	0.023 222
spades-short-contigs	SSPACE	21.52	31.47	0.023 644
spades-short-scaffolds	SSPACE	20.29	37.76	0.023 624
TOTAL	SSPACE	151.9	257.4	0.2
AVERAGE	SSPACE	21.7	36.8	0.0
minia-short-contigs	BESST	53.18	54.84	0.022 638
minia-short-contigs-multik	BESST	30.91	36.98	0.024 014
velvet-short-scaffolds	BESST	28.44	29.38	0.024 243
spades-all-contigs	BESST	29.65	30.43	0.024 707
spades-all-scaffolds	BESST	29.45	30.47	0.024 905
spades-short-contigs	BESST	30.09	31.13	0.024 318
spades-short-scaffolds	BESST	28.64	36.68	0.024 344
TOTAL	BESST	230.4	249.9	0.2
AVERAGE	BESST	32.9	35.7	0.0

Summary

tool	user time	wall clock time	peak memory (GB)
BESST-v2	33.8	35.9	0.0
OPERA	715.1	938.0	0.0
SCARPA	65.6	142.4	0.1
SCAFFMATCH	380.4	207.4	0.4
SOPRA	137.4	159.5	0.0
SSPACE	21.7	36.8	0.0
BESST	32.9	35.7	0.0

6 BESST-v1 vs BESST-v2

Here we compare how BESST-v2 with a biological MP library compares to BESST with an "ideal" MP library, *i.e.* containing only MP reads. We removed all PE reads and other mis-aligning reads (not rf orientation or mapping far away from expected distance: over 10k bp apart) in the hs14 library by mapping the library onto the hs14 reference. Only the reads mapping in MP orientation were kept and passed to BESST-v1 for scaffolding of the hs14 contig assemblies. This could be seen as an ideal case scenario[1] for an approach where an adapter-filtering is used together with BESST — *i.e.*, finding the adapters in all correctly mappable reads, thus being able to fully sort out the reads into ff,rf,fr groups. As this serves as an ideal case scenario for adapter filtering, it will much likely give high quality scaffolding results with BESST, thus in practice a near higher bound on scaffolding quality (we say near optimal because with *e.g.* PE-contaminant we can potentially gain som quality by placing more smaller contigs into scaffolds — which we also see in results below). Moreover by comparing difference between BESST with original library and ideal library, together with BESST-v2 with original library, we can see how much is corrected with our approach, and if we come close to the results of BESST with an "ideal" library.

Table shows the near ideal case scaffolding with BESST, shows BESST-v2 performance on original library and shows BESST on the original library. In general, BESST-v2 comes close to the performance of BESST with an ideal library. In some cases (Allpaths-LG and CABOG) it even slightly, but strictly improves over BESST. On ABySS2, MSR-CA, and SGA there is a trade-off between errors and corrected contiguity. Even though the average number of errors is higher for BESST-v2, this is caused mainly by the ABySS assembly that contributes to over half of this difference of errors.

By looking at BESST results with the original library, we see that BESST-v2 corrects most of (or even further lower) the errors between the BESST with the original and ideal libraries in all cases except Bambus2. Also, contiguity for BESST-v2 is near contiguity of BESST with the ideal library.

This illustrates that the ILP model works well here in correction scaffolding where PE-contamination is present, and even improving over scaffolding with ideal libraries in a few cases. BESST-v2 will be particularly useful when not all (or almost all) adapters can be found — hence the read orientation cannot be identified.

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST	1.044	2422	3.3
ABySS2	BESST	1.027	1612	3.5
Bambus2	BESST	1.023	2310	4.0
Allpaths-LG	BESST	1.018	723	3.9
CABOG	BESST	1.005	437	3.6
MSR-CA	BESST	1.037	2548	3.5
SGA	BESST	1.033	2588	6.9
SOAPdenovo	BESST	1.025	3683	1.5
Velvet	BESST	1.071	2791	4.2
TOTAL	BESST	9.283	19114.0	34.4
AVERAGE	BESST	1.031	2123.778	3.822

Table S45: BESSTv1 + with filtered MP, hs14

assembly	tool	size-diff	misassm	EA_s/EA_c
ABySS	BESST-v2	1.049	4958	3.0
ABySS2	BESST-v2	1.026	2228	3.6
Bambus2	BESST-v2	1.025	2661	3.5
Allpaths-LG	BESST-v2	1.019	721	3.9
CABOG	BESST-v2	1.005	429	3.7
MSR-CA	BESST-v2	1.029	2410	3.0
SGA	BESST-v2	1.031	3071	7.8
SOAPdenovo	BESST-v2	1.029	4571	1.5
Velvet	BESST-v2	1.055	2961	3.5
TOTAL	BESST-v2	9.268	24010.0	33.5
AVERAGE	BESST-v2	1.03	2667.778	3.722

Table S46: BESST-v2 original data (c=0), hs14

[1]Practically speaking. Misalignments on the reference causing this approach to remove or keep unnecessary reads is low and unlikely to cause problems in the scaffolding.

ABySS	BESST	1.098	10461	2.0
ABySS2	BESST	1.05	4483	2.9
Bambus2	BESST	1.028	2799	3.4
Allpaths-LG	BESST	1.019	726	3.9
CABOG	BESST	1.005	440	3.7
MSR-CA	BESST	1.036	2719	2.9
SGA	BESST	1.052	6715	4.4
SOAPdenovo	BESST	1.04	5601	1.5
Velvet	BESST	1.083	4688	2.7
TOTAL	BESST	9.411	38632	27.4
AVERAGE	BESST	1.046	4292.444	3.044

Table S47: BESSTv1 original data (c=0), hs14

7 Wide MP libraries

Two additional real MP libraries, one for *Rhodobacter sphaeroides* and one for *Escherichia coli*, taken from the study by Ribeiro *et al.* (2012), were also used in the evaluation. These libraries have larger variation in their insert size and thus poses a greater challenge for scaffolding accurately (see Figures SS3 and SS5). We denote them *rhodo_wide* and *ecoli_wide*. For rhodo_wide we used the contigs from the GAGE study and for ecoli_wide we assembled the PE reads and long reads provided by Ribeiro *et al.* (2012) with three different assemblers: Minia, Velvet (Zerbino and Birney, 2008), and SPADES (Bankevich *et al.*, 2012). The rhodo_wide library has a PE-contamination mean insert-size of 181 bp and standard deviation 111 bp. The PE-contamination level is 27% for all forward-reverse oriented pairs, but this level decreases to 13.5% and 5% for PE reads with an insert size larger than 200 bp and 300 bp, respectively (sizes useful for scaffolding). The ecoli_wide has a PE-contamination mean insert-size of 363 bp and standard deviation 128 bp. The PE contamination level is 16% for all forward-reverse oriented pairs. See Figures S4 and S5 in Supplementary data for insert-size histograms on the two libraries.

All scaffolders have difficulties to scaffold rhodo_wide accurately in comparison to the results of rhodo library, see statistics of, *e.g.*, $c_{added} = 0$ in Table **??** and Table S48. The most likely cause for this is the wide MP distribution (see Supplemental data, Figure S3 and Table S1) making it difficult to place contigs accurately. Including small assembly errors, using $N = 100$ in QUAST, when the standard deviation of MP insert-size is 1465 bp is bound to overestimate real scaffolding mistakes. The difficulty of scaffolding is seen even as we allow for larger misassemblies by increasing to $N = 1000$ (Table S48). SOPRA have fairly few misassemblies, but do almost no scaffolding. SCAFFMATCH scaffolds more, but with significantly higher error rate than other scaffolders. SSPACE has a fairly good tradeoff between misassembly and connectivity, but not to the same degree as BESST and BESST-v2 which show their strengths of scaffolding with wider distributions. Results for the ecoli_wide library (Table S49) are similar to the rhodo_wide library; scaffolders have difficulties due to the wide distribution, but BESST-v2 show a favorable tradeoff of contiguity and misassembly. The difference between BESST-v2 and BESST is more significant for the ecoli_wide dataset even though all the assemblies are of high quality. This may be explained by a higher PE-contamination span coverage for ecoli_wide than rhodo_wide (twice the average insert size compared to rhodo_wide), thus giving better short-range connectivity (see Supplemental Figure S5).

Table S48: Original GAGE contig assemblies of rhodo scaffolded with the rhodo_wide library. N is the maximum allowed discrepancy of two flanking positions to a break point between the reference and assembly in order for QUAST to call that break point an error. Scaffolding accurately is more difficult with this library as seen in the general increase in errors and decrease in E'_s. Full results are found in Tables S10-S11 in Supplementary data.

Tool		N = 100		N = 1000	
	Infl.	Scf-errors	E'_s/E'_c	Scf-errors	E'_s/E'_c
BESST-v2	1.009	102.2	1.9	23.8	6.4
BESST	1.009	105.0	1.9	27.1	6.3
OPERA	1.004	159.1	2.0	52.8	3.5
SCARPA	1.01	94.2	1.5	27.1	2.0
SCAFFMATCH	1.036	354.9	**2.7**	149.3	**7.4**
SOPRA	1.005	**43.7**	1.1	**8.9**	1.1
SSPACE	1.006	63.7	1.2	12.8	1.511
	Size	Ctg-errors	E'_c	Ctg-errors	E'_c
ORIGINAL	4640197	63.0	24662.2	17.9	43101.7

Table S49: Ecoli assemblies from Minia, Spades and Velvet scaffolded with the ecoli_wide library. SOPRA and SSPACE (starred) results are with BWA alignments for this data set as they scaffolded almost nothing with Bowtie alignments. Full results are found in Supplementary data.

Tool		N = 100		N = 1000	
	Infl.	Scf-errors	E'_s/E'_c	Scf-errors	E'_s/E'_c
BESST-v2	1.011	59.6	1.6	13.9	**5.3**
BESST	1.012	64.9	1.6	19.1	4.9
OPERA	1.001	28.3	1.4	7.7	2.4
SCARPA	1.002	**13.6**	1.0	3.7	1.1
SCAFFMATCH	1.005	78.9	1.5	35.7	2.7
SOPRA*	1.001	14.3	1.0	3.9	1.2
SSPACE*	1.003	39.7	1.5	7.7	2.5
	Size	Ctg-errors	E'_c	Ctg-errors	E'_c
ORIGINAL	4586734.9	8.4	128336.8	1.4	167206.5

8 Additional fragmented assembly investigation

All the ecoli_wide assemblies are of fairly high quality (consisting of between 150 and 300 contigs). We therefore created a more fragmented assembly of ecoli_wide by subsampling the paired end library reads, given by Ribeiro *et al.* (2012), to a 10x coverage and assembled them with SPADES. This gave an assembly of 1700 contigs which we denote SPADES_10x. We also further investigated the two most fragmented assembies on rhodobacter (ABySS and SGA).

The modest difference between BESST-v2 and BESST of rhodo_wide in the main manuscript (Table 6) mainly comes from one of the fragmented assemblies (ABySS, see Tables S10–S11). BESST and BESST-v2 have difficulties scaffolding the most fragmented data set, the SGA assembly, as not enough contigs are classified as "large" according to the default parameters ($\geq \mu + 4\sigma$), which is close to 9000 bp for the rhodo_wide library. To further investigate the effect of PE contamination on fragmented assemblies, we decided to run BESST and BESST-v2 with non default parameters (see Section 2.1) to maximize scaffolding for the more fragmented assemblies. We chose ABySS and SGA with rhodo_wide and SPADES_10x with ecoli_wide, see Table S50. We see that up to 35% more misassemblies are introduced by comparing BESST versions on the SPADES_10x assembly with $N = 1000$, and 30% more misassemblies in the SGA assembly with $N = 1000$. Useful PE edges are formed in $\mathcal{G}$ in the fragmented assemblies, even with the modest contamination insert size in rhodo_wide and contamination level in ecoli_wide. This claim if further supported by investigating Table S13, where BESST-v2 reduce 54% of BESST's errors (6715-3071)/6715 = 0.542, from SGA assembly and 53% (10461-4958)/10461 = 0.526 on ABySS Table S13.

Table S50: BESST scaffolding on the two most fragmented assemblies (ABySS and SGA) from rhodo and the fragmented assembly SPADES_10x on ecoli. We have modified the parameters in BESST here to increase scaffolding (see supplementary data for run commands). This was done to further illustrate that a significant part of edges being formed in the contig graph on fragmented assemblies is from PE oriented reads, even though the modest insert size of, *e.g.*, 180 bp in the rhodo_wide library. Minimum number of links needed to form an edge is here 3 links.

Tool			N = 100		N = 1000	
	Assembly	Infl.	Scf-errors	E'_s/E'_c	Scf-errors	E'_s/E'_c
BESST-v2	ABySS	1.076	763	1.5	209	4.0
BESST	ABySS	1.079	793	1.4	237	3.6
BESST-v2	SGA	1.056	590	1.9	161	5.3
BESST	SGA	1.060	647	1.8	207	4.6
BESST-v2	SPADES-10x	1.027	436	2.7	166	6.6
BESST	SPADES-10x	1.031	500	2.6	224	6.0
		Size	Ctg-errors	E'_c	Ctg-errors	E'_c
ORIGINAL	ABySS	5045660	86	8363.3	85	8367.0
ORIGINAL	SGA	4637887	2	3240.5	1	3242.2
ORIGINAL	SPADES-10x	4504919	30	5405.9	19	5431.7

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