```
Command line: /home/jmaciejewski/miniforge3/envs/micro/bin/spades.py   -t    5
      --nanopore  /home/jmaciejewski/Lab1/NP_chop_filt.fastq     -1
      /home/jmaciejewski/Lab1/il_qual_1.fastq   -2
      /home/jmaciejewski/Lab1/il_qual_2.fastq   -o
      /home/jmaciejewski/Lab1/spades     --cov-cutoff     10    --isolate

System information:
  SPAdes version: 4.0.0
  Python version: 3.13.9
  OS: Linux-6.8.0-88-generic-x86_64-with-glibc2.39

Output dir: /home/jmaciejewski/Lab1/spades
Mode: ONLY assembling (without read error correction)
Debug mode is turned OFF

Dataset parameters:
  Isolate mode
  Reads:
    Library number: 1, library type: nanopore
      left reads: not specified
      right reads: not specified
      interlaced reads: not specified
      single reads: ['/home/jmaciejewski/Lab1/NP_chop_filt.fastq']
      merged reads: not specified
    Library number: 2, library type: paired-end
      orientation: fr
      left reads: ['/home/jmaciejewski/Lab1/il_qual_1.fastq']
      right reads: ['/home/jmaciejewski/Lab1/il_qual_2.fastq']
      interlaced reads: not specified
      single reads: not specified
      merged reads: not specified
Assembly parameters:
  k: automatic selection based on read length
  Repeat resolution is enabled
  Mismatch careful mode is turned OFF
  MismatchCorrector will be SKIPPED
  Coverage cutoff is turned ON and threshold is 10.000000
  Assembly graph output will use GFA v1.2 format
Other parameters:
  Dir for temp files: /home/jmaciejewski/Lab1/spades/tmp
  Threads: 5
  Memory limit (in Gb): 250


======= SPAdes pipeline started. Log can be found here:
/home/jmaciejewski/Lab1/spades/spades.log

/home/jmaciejewski/Lab1/il_qual_1.fastq: max reads length: 151
/home/jmaciejewski/Lab1/il_qual_2.fastq: max reads length: 151

Reads length: 151

Default k-mer sizes were set to [21, 33, 55, 77] because estimated read length
(151) is equal to or greater than 150

===== Before start started.


===== Assembling started.
```

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===== K21 started.


== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/spades-core
/home/jmaciejewski/Lab1/spades/K21/configs/config.info
/home/jmaciejewski/Lab1/spades/K21/configs/isolate_mode.info

  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K21/configs/config.info"
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K21/configs/isolate_mode.info"
  0:00:00.000     1M / 21M   INFO    General                 (memory_limit.cpp
:  55)   Memory limit set to 250 Gb
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 102)   Starting SPAdes, built from N/A, git revision N/A
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 103)   Maximum k-mer length: 128
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 104)   Assembling dataset ("/home/jmaciejewski/Lab1/spades/dataset.info") with
K=21
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 105)   Maximum # of threads to use (adjusted due to OMP capabilities): 5
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 212)   SPAdes started
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 225)   Starting from stage: read_conversion
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 234)   Two-step repeat resolution disabled
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 689)   Graph created, vertex min_id: 3, edge min_id: 3
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 690)   Vertex size: 48, edge size: 40
  0:00:00.000     1M / 21M   INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:00.000     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == Binary Read Conversion (id: read_conversion)
  0:00:00.001     1M / 21M   INFO    General                 (read_converter.cpp
:  78)   Converting reads to binary format for library #0 (takes a while)
  0:00:00.001     1M / 21M   INFO    General                 (read_converter.cpp
:  99)   Converting paired reads
  0:00:00.016    29M / 35M   INFO    General                 (binary_converter.cpp
: 143)   0 reads written
  0:00:00.018     1M / 35M   INFO    General                 (read_converter.cpp
: 113)   Converting single reads
  0:00:01.408    40M / 165M  INFO    General                 (binary_converter.cpp
: 143)   7823 reads written
  0:00:01.418     0M / 165M  INFO    General                 (read_converter.cpp
: 119)   Converting merged reads
  0:00:01.420     0M / 165M  INFO    General                 (binary_converter.cpp
: 143)   0 reads written
  0:00:01.421     0M / 165M  INFO    General                 (read_converter.cpp
:  78)   Converting reads to binary format for library #1 (takes a while)
  0:00:01.421     0M / 165M  INFO    General                 (read_converter.cpp
:  99)   Converting paired reads
  0:00:01.742     0M / 250M  INFO    General                 (binary_converter.cpp
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: 127)   16384 reads processed
  0:00:01.755     0M / 250M  INFO    General                 (binary_converter.cpp
: 127)   32768 reads processed
  0:00:01.775     0M / 250M  INFO    General                 (binary_converter.cpp
: 127)   65536 reads processed
  0:00:01.915     0M / 250M  INFO    General                 (binary_converter.cpp
: 127)   131072 reads processed
  0:00:02.263     0M / 250M  INFO    General                 (binary_converter.cpp
: 127)   262144 reads processed
  0:00:02.441     0M / 250M  INFO    General                 (binary_converter.cpp
: 143)   276542 reads written
  0:00:02.455     0M / 250M  INFO    General                 (read_converter.cpp
: 113)   Converting single reads
  0:00:02.464     0M / 250M  INFO    General                 (binary_converter.cpp
: 143)   0 reads written
  0:00:02.464     0M / 250M  INFO    General                 (read_converter.cpp
: 119)   Converting merged reads
  0:00:02.469     0M / 250M  INFO    General                 (binary_converter.cpp
: 143)   0 reads written
  0:00:02.482     1M / 250M  INFO   StageManager             (stage.cpp
: 189)   STAGE == de Bruijn graph construction (id: construction)
  0:00:02.488     1M / 250M  INFO    General                 (construction.cpp
: 150)   Max read length 151
  0:00:02.488     1M / 250M  INFO    General                 (construction.cpp
: 156)   Average read length 146.924
  0:00:02.488     1M / 250M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == k+1-mer counting (id: construction:kpomer_counting)
  0:00:02.488     1M / 250M  INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:02.488     1M / 250M  INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:02.488     1M / 250M  INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:02.488     1M / 250M  INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 1342177
  0:00:03.938  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 128)   Processed 1106168 reads
  0:00:03.938     1M / 635M  INFO    General                 (kmer_splitters.hpp
: 134)   Used 1106168 reads
  0:00:03.961     1M / 635M  INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:03.995     1M / 635M  INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 10906718 kmers
in total.
  0:00:03.995     1M / 635M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Extension index construction (id:
construction:extension_index_construction)
  0:00:03.996     1M / 635M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 453)   Building kmer index
  0:00:03.996     1M / 635M  INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:03.996     1M / 635M  INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:03.996     1M / 635M  INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:03.996     1M / 635M  INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 1342177
```

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  0:00:04.563  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 197)   Processed 10906718 kmers
  0:00:04.563  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 202)   Used 10906718 kmers.
  0:00:04.563     1M / 635M  INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:04.607     1M / 635M  INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 10868922 kmers
in total.
  0:00:04.607     1M / 635M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:04.844     9M / 635M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 10868922 kmers, 7888088
bytes occupied (5.80598 bits per kmer).
  0:00:04.844     9M / 635M  INFO    General
(kmer_index_builder.hpp    : 168)   Merging final buckets.
  0:00:04.957    20M / 635M  INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 101)   Building k-mer extensions from k+1-mers
  0:00:05.726    20M / 635M  INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 106)   Building k-mer extensions from k+1-mers
finished.
  0:00:05.730    20M / 635M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Early tip clipping (id: construction:early_tip_clipper)
  0:00:05.730    20M / 635M  INFO    General                 (construction.cpp
: 298)   Early tip clipper length bound set as (RL - K)
  0:00:05.730    20M / 635M  INFO   Early tip clipping
(early_simplification.hpp  :  48)   Early tip clipping
  0:00:06.366    23M / 635M  INFO   Early tip clipping
(early_simplification.hpp  :  83)   #tipped junctions: 39180
  0:00:06.370    23M / 635M  INFO   Early tip clipping
(early_simplification.hpp  :  94)   Clipped tips: 39941
  0:00:06.374    20M / 635M  INFO   Early tip clipping
(early_simplification.hpp  :  50)   1218514 22-mers were removed by early tip
clipper
  0:00:06.374    20M / 635M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Condensing graph (id: construction:graph_condensing)
  0:00:06.375    20M / 635M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 381)   Extracting unbranching paths
  0:00:07.267    31M / 635M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 400)   Extracting unbranching paths finished. 256399
sequences extracted
  0:00:07.783    31M / 635M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 336)   Collecting perfect loops
  0:00:07.989    31M / 635M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 369)   Collecting perfect loops finished. 119 loops
collected
  0:00:08.002    31M / 635M  INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 586)   Sorting edges...
  0:00:08.017    31M / 635M  INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 588)   Edges sorted
  0:00:08.017    31M / 635M  INFO    General
(debruijn_graph_constructor: 516)   Total 513036 edges to create
  0:00:08.018    51M / 635M  INFO    General
(debruijn_graph_constructor: 519)   Collecting link records
  0:00:08.182    59M / 635M  INFO    General
(debruijn_graph_constructor: 521)   Ordering link records
  0:00:08.197    59M / 635M  INFO    General
(debruijn_graph_constructor: 524)   Sorting done
  0:00:08.201    61M / 635M  INFO    General
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(debruijn_graph_constructor: 537)   Sorting LinkRecords...
  0:00:08.208    61M / 635M  INFO    General
(debruijn_graph_constructor: 540)   LinkRecords sorted
  0:00:08.208    61M / 635M  INFO    General
(debruijn_graph_constructor: 542)   Total 218722 vertices to create
  0:00:08.208    82M / 635M  INFO    General
(debruijn_graph_constructor: 545)   Connecting the graph
  0:00:08.392    68M / 635M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Filling coverage indices (PHM) (id:
construction:coverage_filling_phm)
  0:00:08.392    68M / 635M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:08.623    76M / 635M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 10906718 kmers, 7915176
bytes occupied (5.80573 bits per kmer).
  0:00:08.648   120M / 635M  INFO    General
(coverage_hash_map_builder.:  49)   Collecting k-mer coverage information from
reads, this takes a while.
  0:00:11.486   120M / 635M  INFO    General                 (construction.cpp
: 427)   Filling coverage and flanking coverage from PHM
  0:00:12.213   120M / 635M  INFO    General                 (coverage_filling.hpp
:  83)   Processed 512976 edges
  0:00:12.265    49M / 635M  INFO   StageManager             (stage.cpp
: 189)   STAGE == EC Threshold Finding (id: ec_threshold_finder)
  0:00:12.265    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 182)   Kmer coverage valley at: 16
  0:00:12.265    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 202)   K-mer histogram maximum: 42
  0:00:12.265    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 238)   Estimated median coverage: 45. Coverage mad:
10.3782
  0:00:12.265    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 260)   Fitting coverage model
  0:00:12.338    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 2
  0:00:12.553    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 4
  0:00:13.182    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 8
  0:00:14.768    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 16
  0:00:17.270    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 310)   Fitted mean coverage: 44.5829. Fitted coverage
std. dev: 10.0572
  0:00:17.273    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 335)   Probability of erroneous kmer at valley:
9.62844e-05
  0:00:17.273    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 359)   Preliminary threshold calculated as: 16
  0:00:17.273    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 363)   Threshold adjusted to: 16
  0:00:17.273    49M / 635M  INFO    General
(kmer_coverage_model.cpp   : 376)   Estimated genome size (ignoring repeats):
1242291
  0:00:17.273    49M / 635M  INFO    General
(genomic_info_filler.cpp   :  56)   Mean coverage was calculated as 44.5829
  0:00:17.273    49M / 635M  INFO    General
(genomic_info_filler.cpp   :  71)   EC coverage threshold value was calculated as
16
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  0:00:17.273    49M / 635M  INFO    General
(genomic_info_filler.cpp   :  72)   Trusted kmer low bound: 8.57069
  0:00:17.273    49M / 635M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Raw Simplification (id: raw_simplification)
  0:00:17.273    49M / 635M  INFO    General                 (simplification.cpp
: 129)   PROCEDURE == Initial cleaning
  0:00:17.273    49M / 635M  INFO    General
(graph_simplification.hpp  : 674)   Flanking coverage based disconnection disabled
  0:00:17.273    49M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Self conjugate edge remover
  0:00:17.288    49M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Self conjugate edge remover triggered 0 times
  0:00:17.288    49M / 635M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification (id: simplification)
  0:00:17.288    49M / 635M  INFO    General                 (simplification.cpp
: 397)   Graph simplification started
  0:00:17.288    49M / 635M  INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:17.288    49M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 1
  0:00:17.288    49M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:17.315    49M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 2855 times
  0:00:17.315    49M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:19.201    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 23481 times
  0:00:19.202    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:19.460    58M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 39211 times
  0:00:19.461    58M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 2
  0:00:19.461    58M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:19.486    56M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1258 times
  0:00:19.486    56M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:19.856    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 1856 times
  0:00:19.856    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:19.918    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 10548 times
  0:00:19.919    55M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 3
  0:00:19.919    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:19.924    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 119 times
  0:00:19.924    55M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.020    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 700 times
  0:00:20.021    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.033    54M / 635M  INFO   Simplification
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(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 2148 times
  0:00:20.033    54M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 4
  0:00:20.033    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.035    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 6 times
  0:00:20.035    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.070    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 302 times
  0:00:20.070    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.077    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 1107 times
  0:00:20.077    54M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 5
  0:00:20.077    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.078    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 6 times
  0:00:20.078    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.098    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 194 times
  0:00:20.098    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.101    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 576 times
  0:00:20.101    54M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 6
  0:00:20.101    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.102    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 10 times
  0:00:20.102    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.115    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 124 times
  0:00:20.115    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.117    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 331 times
  0:00:20.117    54M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 7
  0:00:20.117    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.117    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1 times
  0:00:20.117    54M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.125    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 73 times
  0:00:20.125    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.127    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 254 times
  0:00:20.127    53M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 8
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  0:00:20.127    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.127    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.127    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.133    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 57 times
  0:00:20.134    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.135    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 176 times
  0:00:20.135    53M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 9
  0:00:20.135    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.135    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.135    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.140    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 58 times
  0:00:20.140    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.141    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 121 times
  0:00:20.141    53M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 10
  0:00:20.141    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.141    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.141    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.144    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 32 times
  0:00:20.144    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.145    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 106 times
  0:00:20.145    53M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 11
  0:00:20.145    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.150    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 2 times
  0:00:20.150    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.160    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 33 times
  0:00:20.161    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:20.165    53M / 635M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 12
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.165    53M / 635M  INFO   Simplification
```

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(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:20.165    53M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:20.168    44M / 635M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification Cleanup (id: simplification_cleanup)
  0:00:20.168    44M / 635M  INFO    General                 (simplification.cpp
: 189)   PROCEDURE == Post simplification
  0:00:20.168    44M / 635M  INFO    General
(graph_simplification.hpp  : 455)   Disconnection of relatively low covered edges
disabled
  0:00:20.168    44M / 635M  INFO    General
(graph_simplification.hpp  : 494)   Complex tip clipping disabled
  0:00:20.168    44M / 635M  INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:20.168    44M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.172    44M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.172    44M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.180    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 1 times
  0:00:20.180    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.184    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.184    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.192    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:20.192    45M / 635M  INFO    General                 (simplification.cpp
: 348)   Disrupting self-conjugate edges
  0:00:20.202    45M / 635M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Removing isolated edges
  0:00:20.230    44M / 635M  INFO   Simplification
(parallel_processing.hpp   : 171)   Removing isolated edges triggered 35789 times
  0:00:20.230    43M / 635M  INFO    General                 (simplification.cpp
: 358)   Removing all the edges having coverage 8.57069 and less
  0:00:20.243    42M / 635M  INFO    General                 (simplification.cpp
: 508)   After simplification:
  0:00:20.244    42M / 635M  INFO    General                 (simplification.cpp
: 509)     Average coverage = 47.6157
  0:00:20.244    42M / 635M  INFO    General                 (simplification.cpp
: 510)     Total length = 1240328
  0:00:20.246    42M / 635M  INFO    General                 (simplification.cpp
: 511)     Median edge length: 125211
  0:00:20.246    42M / 635M  INFO    General                 (simplification.cpp
: 512)     Edges: 4902
  0:00:20.246    42M / 635M  INFO    General                 (simplification.cpp
: 513)     Vertices: 3132
  0:00:20.246    42M / 635M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Contig Output (id: contig_output)
  0:00:20.246    42M / 635M  INFO    General                 (read_converter.cpp
```

```
: 135)   Outputting contigs to
"/home/jmaciejewski/Lab1/spades/K21/simplified_contigs"
  0:00:20.250    46M / 635M  INFO    General                 (binary_converter.cpp
: 143)   2453 reads written
  0:00:20.252    42M / 635M  INFO    General                 (pipeline.cpp
: 292)   SPAdes finished
  0:00:20.255     1M / 635M  INFO    General                 (main.cpp
: 131)   Assembling time: 0 hours 0 minutes 20 seconds

===== K21 finished.


===== K33 started.


== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/spades-core
/home/jmaciejewski/Lab1/spades/K33/configs/config.info
/home/jmaciejewski/Lab1/spades/K33/configs/isolate_mode.info

  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K33/configs/config.info"
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K33/configs/isolate_mode.info"
  0:00:00.000     1M / 21M   INFO    General                 (memory_limit.cpp
:  55)   Memory limit set to 250 Gb
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 102)   Starting SPAdes, built from N/A, git revision N/A
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 103)   Maximum k-mer length: 128
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 104)   Assembling dataset ("/home/jmaciejewski/Lab1/spades/dataset.info") with
K=33
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 105)   Maximum # of threads to use (adjusted due to OMP capabilities): 5
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 212)   SPAdes started
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 225)   Starting from stage: read_conversion
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 234)   Two-step repeat resolution disabled
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 689)   Graph created, vertex min_id: 3, edge min_id: 3
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 690)   Vertex size: 48, edge size: 40
  0:00:00.000     1M / 21M   INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:00.000     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == Binary Read Conversion (id: read_conversion)
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
:  57)   Binary reads detected
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
:  57)   Binary reads detected
  0:00:00.001     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == de Bruijn graph construction (id: construction)
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 115)   Contigs from previous K will be used:
/home/jmaciejewski/Lab1/spades/K21/simplified_contigs
```

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  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 150)   Max read length 151
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 156)   Average read length 146.924
  0:00:00.001     1M / 21M   INFO    General                 (stage.cpp
: 121)   PROCEDURE == k+1-mer counting (id: construction:kpomer_counting)
  0:00:00.001     1M / 21M   INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:00.001     1M / 21M   INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 671088
  0:00:01.547  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 128)   Processed 1111074 reads
  0:00:01.548     1M / 1131M INFO    General                 (kmer_splitters.hpp
: 134)   Used 1111074 reads
  0:00:01.588     1M / 1131M INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:01.641     1M / 1131M INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 10932768 kmers
in total.
  0:00:01.641     1M / 1131M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Extension index construction (id:
construction:extension_index_construction)
  0:00:01.642     1M / 1131M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 453)   Building kmer index
  0:00:01.642     1M / 1131M INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:01.642     1M / 1131M INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:01.642     1M / 1131M INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:01.642     1M / 1131M INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 671088
  0:00:02.335  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 197)   Processed 10932768 kmers
  0:00:02.335  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 202)   Used 10932768 kmers.
  0:00:02.335     1M / 1131M INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:02.403     1M / 1131M INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 10953278 kmers
in total.
  0:00:02.403     1M / 1131M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:02.656     9M / 1131M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 10953278 kmers, 7948704
bytes occupied (5.80553 bits per kmer).
  0:00:02.656     9M / 1131M INFO    General
(kmer_index_builder.hpp    : 168)   Merging final buckets.
  0:00:02.859    20M / 1131M INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 101)   Building k-mer extensions from k+1-mers
  0:00:03.703    20M / 1131M INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 106)   Building k-mer extensions from k+1-mers
finished.
```

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  0:00:03.712    20M / 1131M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Early tip clipping (id: construction:early_tip_clipper)
  0:00:03.712    20M / 1131M INFO    General                 (construction.cpp
: 298)   Early tip clipper length bound set as (RL - K)
  0:00:03.712    20M / 1131M INFO   Early tip clipping
(early_simplification.hpp  :  48)   Early tip clipping
  0:00:04.366    23M / 1131M INFO   Early tip clipping
(early_simplification.hpp  :  83)   #tipped junctions: 35172
  0:00:04.370    23M / 1131M INFO   Early tip clipping
(early_simplification.hpp  :  94)   Clipped tips: 35829
  0:00:04.377    20M / 1131M INFO   Early tip clipping
(early_simplification.hpp  :  50)   1066599 34-mers were removed by early tip
clipper
  0:00:04.377    20M / 1131M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Condensing graph (id: construction:graph_condensing)
  0:00:04.378    20M / 1131M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 381)   Extracting unbranching paths
  0:00:05.300    29M / 1131M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 400)   Extracting unbranching paths finished. 160881
sequences extracted
  0:00:05.861    29M / 1131M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 336)   Collecting perfect loops
  0:00:06.073    29M / 1131M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 369)   Collecting perfect loops finished. 81 loops
collected
  0:00:06.086    29M / 1131M INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 586)   Sorting edges...
  0:00:06.095    29M / 1131M INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 588)   Edges sorted
  0:00:06.095    29M / 1131M INFO    General
(debruijn_graph_constructor: 516)   Total 321924 edges to create
  0:00:06.095    42M / 1131M INFO    General
(debruijn_graph_constructor: 519)   Collecting link records
  0:00:06.198    47M / 1131M INFO    General
(debruijn_graph_constructor: 521)   Ordering link records
  0:00:06.207    47M / 1131M INFO    General
(debruijn_graph_constructor: 524)   Sorting done
  0:00:06.210    49M / 1131M INFO    General
(debruijn_graph_constructor: 537)   Sorting LinkRecords...
  0:00:06.215    49M / 1131M INFO    General
(debruijn_graph_constructor: 540)   LinkRecords sorted
  0:00:06.215    49M / 1131M INFO    General
(debruijn_graph_constructor: 542)   Total 181472 vertices to create
  0:00:06.215    66M / 1131M INFO    General
(debruijn_graph_constructor: 545)   Connecting the graph
  0:00:06.356    56M / 1131M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Filling coverage indices (PHM) (id:
construction:coverage_filling_phm)
  0:00:06.356    56M / 1131M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:06.608    64M / 1131M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 10932768 kmers, 7933880
bytes occupied (5.80558 bits per kmer).
  0:00:06.633   108M / 1131M INFO    General
(coverage_hash_map_builder.:  49)   Collecting k-mer coverage information from
reads, this takes a while.
  0:00:09.232   108M / 1131M INFO    General                 (construction.cpp
: 427)   Filling coverage and flanking coverage from PHM
  0:00:09.954   108M / 1131M INFO    General                 (coverage_filling.hpp
```

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:  83)   Processed 321920 edges
  0:00:10.035    37M / 1131M INFO   StageManager             (stage.cpp
: 189)   STAGE == EC Threshold Finding (id: ec_threshold_finder)
  0:00:10.035    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 182)   Kmer coverage valley at: 13
  0:00:10.035    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 202)   K-mer histogram maximum: 39
  0:00:10.036    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 238)   Estimated median coverage: 41. Coverage mad:
10.3782
  0:00:10.036    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 260)   Fitting coverage model
  0:00:10.084    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 2
  0:00:10.227    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 4
  0:00:10.616    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 8
  0:00:11.724    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 16
  0:00:13.434    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 310)   Fitted mean coverage: 40.0909. Fitted coverage
std. dev: 9.77684
  0:00:13.436    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 335)   Probability of erroneous kmer at valley:
5.36393e-09
  0:00:13.436    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 359)   Preliminary threshold calculated as: 13
  0:00:13.436    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 363)   Threshold adjusted to: 13
  0:00:13.436    37M / 1131M INFO    General
(kmer_coverage_model.cpp   : 376)   Estimated genome size (ignoring repeats):
1241479
  0:00:13.436    37M / 1131M INFO    General
(genomic_info_filler.cpp   :  56)   Mean coverage was calculated as 40.0909
  0:00:13.436    37M / 1131M INFO    General
(genomic_info_filler.cpp   :  71)   EC coverage threshold value was calculated as
13
  0:00:13.436    37M / 1131M INFO    General
(genomic_info_filler.cpp   :  72)   Trusted kmer low bound: 7.75394
  0:00:13.436    37M / 1131M INFO   StageManager             (stage.cpp
: 189)   STAGE == Raw Simplification (id: raw_simplification)
  0:00:13.436    37M / 1131M INFO    General                 (simplification.cpp
: 129)   PROCEDURE == Initial cleaning
  0:00:13.436    37M / 1131M INFO    General
(graph_simplification.hpp  : 674)   Flanking coverage based disconnection disabled
  0:00:13.436    37M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Self conjugate edge remover
  0:00:13.445    37M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Self conjugate edge remover triggered 0 times
  0:00:13.445    37M / 1131M INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification (id: simplification)
  0:00:13.445    37M / 1131M INFO    General                 (simplification.cpp
: 397)   Graph simplification started
  0:00:13.445    37M / 1131M INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:13.445    37M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 1
  0:00:13.445    37M / 1131M INFO   Simplification
```

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(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:13.466    37M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 2563 times
  0:00:13.466    37M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.307    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 14616 times
  0:00:14.308    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.419    40M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 13603 times
  0:00:14.420    40M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 2
  0:00:14.420    40M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.435    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 956 times
  0:00:14.435    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.652    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 907 times
  0:00:14.652    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.691    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 4145 times
  0:00:14.691    39M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 3
  0:00:14.691    39M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.694    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 129 times
  0:00:14.694    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.752    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 332 times
  0:00:14.752    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.758    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 1110 times
  0:00:14.759    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 4
  0:00:14.759    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.760    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 13 times
  0:00:14.760    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.788    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 197 times
  0:00:14.788    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.795    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 533 times
  0:00:14.795    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 5
  0:00:14.795    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.795    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 7 times
```

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  0:00:14.795    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.812    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 148 times
  0:00:14.812    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.813    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 219 times
  0:00:14.813    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 6
  0:00:14.813    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.813    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 5 times
  0:00:14.813    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.822    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 82 times
  0:00:14.822    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.823    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 132 times
  0:00:14.823    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 7
  0:00:14.823    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.823    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1 times
  0:00:14.823    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.829    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 57 times
  0:00:14.829    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.831    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 101 times
  0:00:14.831    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 8
  0:00:14.831    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.831    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.831    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.835    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 37 times
  0:00:14.835    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.836    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 61 times
  0:00:14.836    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 9
  0:00:14.836    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.836    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.836    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.838    38M / 1131M INFO   Simplification
```

```
(parallel_processing.hpp   : 171)   Bulge remover triggered 26 times
  0:00:14.838    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.839    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 44 times
  0:00:14.839    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 10
  0:00:14.839    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.839    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.839    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.840    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 17 times
  0:00:14.840    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.842    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 43 times
  0:00:14.842    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 11
  0:00:14.842    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.847    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 4 times
  0:00:14.847    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.855    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 25 times
  0:00:14.855    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:14.859    38M / 1131M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 12
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.859    38M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:14.862    34M / 1131M INFO   StageManager            (stage.cpp
: 189)   STAGE == Simplification Cleanup (id: simplification_cleanup)
  0:00:14.862    34M / 1131M INFO    General                 (simplification.cpp
: 189)   PROCEDURE == Post simplification
  0:00:14.862    34M / 1131M INFO    General
(graph_simplification.hpp  : 455)   Disconnection of relatively low covered edges
disabled
  0:00:14.862    34M / 1131M INFO    General
(graph_simplification.hpp  : 494)   Complex tip clipping disabled
  0:00:14.862    34M / 1131M INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:14.862    34M / 1131M INFO   Simplification
```

```
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.866    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.866    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.872    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.872    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.876    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.876    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.881    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.882    34M / 1131M INFO    General                 (simplification.cpp
: 348)   Disrupting self-conjugate edges
  0:00:14.894    34M / 1131M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Removing isolated edges
  0:00:14.931    33M / 1131M INFO   Simplification
(parallel_processing.hpp   : 171)   Removing isolated edges triggered 48704 times
  0:00:14.932    32M / 1131M INFO    General                 (simplification.cpp
: 358)   Removing all the edges having coverage 7.75394 and less
  0:00:14.942    31M / 1131M INFO    General                 (simplification.cpp
: 508)   After simplification:
  0:00:14.942    31M / 1131M INFO    General                 (simplification.cpp
: 509)     Average coverage = 42.6134
  0:00:14.943    31M / 1131M INFO    General                 (simplification.cpp
: 510)     Total length = 1235498
  0:00:14.943    31M / 1131M INFO    General                 (simplification.cpp
: 511)     Median edge length: 688586
  0:00:14.943    31M / 1131M INFO    General                 (simplification.cpp
: 512)     Edges: 1868
  0:00:14.943    31M / 1131M INFO    General                 (simplification.cpp
: 513)     Vertices: 1232
  0:00:14.943    31M / 1131M INFO   StageManager             (stage.cpp
: 189)   STAGE == Contig Output (id: contig_output)
  0:00:14.943    31M / 1131M INFO    General                 (read_converter.cpp
: 135)   Outputting contigs to
"/home/jmaciejewski/Lab1/spades/K33/simplified_contigs"
  0:00:14.947    35M / 1131M INFO    General                 (binary_converter.cpp
: 143)   935 reads written
  0:00:14.948    31M / 1131M INFO    General                 (pipeline.cpp
: 292)   SPAdes finished
  0:00:14.951     1M / 1131M INFO    General                 (main.cpp
: 131)   Assembling time: 0 hours 0 minutes 14 seconds

===== K33 finished.


===== K55 started.


== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/spades-core
/home/jmaciejewski/Lab1/spades/K55/configs/config.info
/home/jmaciejewski/Lab1/spades/K55/configs/isolate_mode.info

  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
```

```
"/home/jmaciejewski/Lab1/spades/K55/configs/config.info"
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K55/configs/isolate_mode.info"
  0:00:00.000     1M / 21M   INFO    General                 (memory_limit.cpp
:  55)   Memory limit set to 250 Gb
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 102)   Starting SPAdes, built from N/A, git revision N/A
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 103)   Maximum k-mer length: 128
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 104)   Assembling dataset ("/home/jmaciejewski/Lab1/spades/dataset.info") with
K=55
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 105)   Maximum # of threads to use (adjusted due to OMP capabilities): 5
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 212)   SPAdes started
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 225)   Starting from stage: read_conversion
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 234)   Two-step repeat resolution disabled
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 689)   Graph created, vertex min_id: 3, edge min_id: 3
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 690)   Vertex size: 48, edge size: 40
  0:00:00.000     1M / 21M   INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 245)   Will need read mapping, kmer mapper will be attached
  0:00:00.000     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == Binary Read Conversion (id: read_conversion)
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
:  57)   Binary reads detected
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
:  57)   Binary reads detected
  0:00:00.001     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == de Bruijn graph construction (id: construction)
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 115)   Contigs from previous K will be used:
/home/jmaciejewski/Lab1/spades/K33/simplified_contigs
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 150)   Max read length 151
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 156)   Average read length 146.924
  0:00:00.001     1M / 21M   INFO    General                 (stage.cpp
: 121)   PROCEDURE == k+1-mer counting (id: construction:kpomer_counting)
  0:00:00.001     1M / 21M   INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:00.001     1M / 21M   INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 671088
  0:00:01.319  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 128)   Processed 1108038 reads
  0:00:01.320     1M / 917M  INFO    General                 (kmer_splitters.hpp
: 134)   Used 1108038 reads
```

```
  0:00:01.352     1M / 917M  INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:01.400     1M / 917M  INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 9924488 kmers in
total.
  0:00:01.400     1M / 917M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Extension index construction (id:
construction:extension_index_construction)
  0:00:01.401     1M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 453)   Building kmer index
  0:00:01.401     1M / 917M  INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:01.401     1M / 917M  INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:01.401     1M / 917M  INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:01.401     1M / 917M  INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 671088
  0:00:02.026  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 197)   Processed 9924488 kmers
  0:00:02.026  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 202)   Used 9924488 kmers.
  0:00:02.026     1M / 917M  INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:02.089     1M / 917M  INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 9986344 kmers in
total.
  0:00:02.089     1M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:02.315     9M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 9986344 kmers, 7249752 bytes
occupied (5.80773 bits per kmer).
  0:00:02.315     9M / 917M  INFO    General
(kmer_index_builder.hpp    : 168)   Merging final buckets.
  0:00:02.501    19M / 917M  INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 101)   Building k-mer extensions from k+1-mers
  0:00:03.240    19M / 917M  INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 106)   Building k-mer extensions from k+1-mers
finished.
  0:00:03.247    19M / 917M  INFO    General                 (stage.cpp
: 121)   PROCEDURE == Condensing graph (id: construction:graph_condensing)
  0:00:03.248    19M / 917M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 381)   Extracting unbranching paths
  0:00:04.113    28M / 917M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 400)   Extracting unbranching paths finished. 165436
sequences extracted
  0:00:04.660    28M / 917M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 336)   Collecting perfect loops
  0:00:04.849    28M / 917M  INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 369)   Collecting perfect loops finished. 3 loops
collected
  0:00:04.861    28M / 917M  INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 586)   Sorting edges...
  0:00:04.870    28M / 917M  INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 588)   Edges sorted
  0:00:04.870    28M / 917M  INFO    General
(debruijn_graph_constructor: 516)   Total 330878 edges to create
  0:00:04.870    41M / 917M  INFO    General
```

```
(debruijn_graph_constructor: 519)   Collecting link records
  0:00:04.975    47M / 917M  INFO    General
(debruijn_graph_constructor: 521)   Ordering link records
  0:00:04.984    47M / 917M  INFO    General
(debruijn_graph_constructor: 524)   Sorting done
  0:00:04.987    49M / 917M  INFO    General
(debruijn_graph_constructor: 537)   Sorting LinkRecords...
  0:00:04.994    49M / 917M  INFO    General
(debruijn_graph_constructor: 540)   LinkRecords sorted
  0:00:04.994    49M / 917M  INFO    General
(debruijn_graph_constructor: 542)   Total 227295 vertices to create
  0:00:04.994    70M / 917M  INFO    General
(debruijn_graph_constructor: 545)   Connecting the graph
  0:00:05.160    60M / 917M  INFO    General                  (stage.cpp
: 121)   PROCEDURE == Filling coverage indices (PHM) (id:
construction:coverage_filling_phm)
  0:00:05.160    60M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:05.384    68M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 9924488 kmers, 7205024 bytes
occupied (5.80788 bits per kmer).
  0:00:05.408   108M / 917M  INFO    General
(coverage_hash_map_builder.:  49)   Collecting k-mer coverage information from
reads, this takes a while.
  0:00:07.501   108M / 917M  INFO    General                  (construction.cpp
: 427)   Filling coverage and flanking coverage from PHM
  0:00:08.194   108M / 917M  INFO    General                  (coverage_filling.hpp
:  83)   Processed 330877 edges
  0:00:08.268    42M / 917M  INFO   StageManager              (stage.cpp
: 189)   STAGE == EC Threshold Finding (id: ec_threshold_finder)
  0:00:08.269    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 182)   Kmer coverage valley at: 9
  0:00:08.269    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 202)   K-mer histogram maximum: 31
  0:00:08.269    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 238)   Estimated median coverage: 32. Coverage mad:
8.8956
  0:00:08.269    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 260)   Fitting coverage model
  0:00:08.306    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 2
  0:00:08.413    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 4
  0:00:08.772    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 8
  0:00:09.193    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 16
  0:00:09.221    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 310)   Fitted mean coverage: 32.303. Fitted coverage
std. dev: 8.73361
  0:00:09.222    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 335)   Probability of erroneous kmer at valley:
1.79525e-06
  0:00:09.222    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 359)   Preliminary threshold calculated as: 9
  0:00:09.222    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 363)   Threshold adjusted to: 9
  0:00:09.222    42M / 917M  INFO    General
(kmer_coverage_model.cpp   : 376)   Estimated genome size (ignoring repeats):
```

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1243622
  0:00:09.222    42M / 917M  INFO    General
(genomic_info_filler.cpp   :  56)   Mean coverage was calculated as 32.303
  0:00:09.222    42M / 917M  INFO    General
(genomic_info_filler.cpp   :  71)   EC coverage threshold value was calculated as 9
  0:00:09.222    42M / 917M  INFO    General
(genomic_info_filler.cpp   :  72)   Trusted kmer low bound: 6.25657
  0:00:09.222    42M / 917M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Gap Closer (id: early_gapcloser)
  0:00:09.228    55M / 917M  INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:09.259    59M / 917M  INFO    General                 (gap_closer.cpp
: 102)   Total edges in tip neighborhood: 180680 out of 330877, length: 15233066
  0:00:09.267    61M / 917M  INFO    General                 (edge_index.hpp
: 196)   Using small index (max_id = 332535)
  0:00:09.338    61M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:09.959    67M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 8158596 kmers, 5893384 bytes
occupied (5.77882 bits per kmer).
  0:00:10.000   131M / 917M  INFO    General
(edge_index_builders.hpp   : 266)   Collecting edge information from graph, this
takes a while.
  0:00:10.383   129M / 917M  INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:00:12.987   133M / 917M  INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:00:13.045    69M / 917M  INFO    General                 (gap_closer.cpp
: 491)   Initializing gap closer
  0:00:13.045    69M / 917M  INFO   GapCloser                (gap_closer.cpp
: 406)   Collecting gap candidates
  0:00:13.066    69M / 917M  INFO   GapCloser                (gap_closer.cpp
: 410)   Total 1354 tips collected, total 1433 connection candidates
  0:00:13.070    69M / 917M  INFO   GapCloser                (gap_closer.cpp
: 431)   Closing short gaps complete: filled 53 gaps after checking 1359 candidates
  0:00:13.076    69M / 917M  INFO    General                 (gap_closer.cpp
: 495)   Gap closer done
  0:00:13.088    42M / 917M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Raw Simplification (id: raw_simplification)
  0:00:13.088    42M / 917M  INFO    General                 (simplification.cpp
: 129)   PROCEDURE == Initial cleaning
  0:00:13.088    42M / 917M  INFO    General
(graph_simplification.hpp  : 674)   Flanking coverage based disconnection disabled
  0:00:13.088    42M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Self conjugate edge remover
  0:00:13.099    42M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Self conjugate edge remover triggered 0 times
  0:00:13.099    42M / 917M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification (id: simplification)
  0:00:13.099    42M / 917M  INFO    General                 (simplification.cpp
: 397)   Graph simplification started
  0:00:13.099    42M / 917M  INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:13.099    42M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 1
  0:00:13.099    42M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:13.258    41M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 31806 times
```

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  0:00:13.259    41M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:13.871    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 5057 times
  0:00:13.872    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:13.881    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 8 times
  0:00:13.881    70M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 2
  0:00:13.881    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:13.885    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 48 times
  0:00:13.885    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:13.885    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 2 times
  0:00:13.885    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:13.931    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 4506 times
  0:00:13.931    70M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 3
  0:00:13.931    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:13.938    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 241 times
  0:00:13.938    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.002    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 164 times
  0:00:14.002    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.012    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 870 times
  0:00:14.012    71M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 4
  0:00:14.012    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.012    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 18 times
  0:00:14.012    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.081    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 206 times
  0:00:14.081    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.083    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 216 times
  0:00:14.083    72M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 5
  0:00:14.083    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.083    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 4 times
  0:00:14.083    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.120    72M / 917M  INFO   Simplification
```

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(parallel_processing.hpp   : 171)   Bulge remover triggered 119 times
  0:00:14.120    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.121    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 77 times
  0:00:14.121    72M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 6
  0:00:14.121    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.121    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.121    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 51 times
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 37 times
  0:00:14.135    72M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 7
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.135    72M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 31 times
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 26 times
  0:00:14.143    73M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 8
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.143    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 22 times
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 15 times
  0:00:14.148    73M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 9
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.148    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.150    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 8 times
  0:00:14.151    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
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  0:00:14.151    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 7 times
  0:00:14.151    73M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 10
  0:00:14.151    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.151    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.151    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.152    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 6 times
  0:00:14.152    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.152    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 2 times
  0:00:14.152    73M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 11
  0:00:14.152    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.159    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1 times
  0:00:14.159    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.165    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 1 times
  0:00:14.165    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.170    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:14.170    73M / 917M  INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 12
  0:00:14.170    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.170    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.170    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.170    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.171    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:14.171    73M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:14.175    71M / 917M  INFO   StageManager            (stage.cpp
: 189)   STAGE == Gap Closer (id: late_gapcloser)
  0:00:14.183    84M / 917M  INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:14.207    88M / 917M  INFO    General                 (gap_closer.cpp
: 102)   Total edges in tip neighborhood: 146676 out of 147328, length: 14325751
  0:00:14.212    89M / 917M  INFO    General                 (edge_index.hpp
: 196)   Using small index (max_id = 332535)
  0:00:14.273    89M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:14.825    95M / 917M  INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 7173492 kmers, 5182148 bytes
occupied (5.77922 bits per kmer).
  0:00:14.860   151M / 917M  INFO    General
(edge_index_builders.hpp   : 266)   Collecting edge information from graph, this
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takes a while.
  0:00:15.242   150M / 917M  INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:00:20.103   153M / 917M  INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:00:20.159    97M / 917M  INFO    General                 (gap_closer.cpp
: 491)   Initializing gap closer
  0:00:20.159    97M / 917M  INFO   GapCloser                (gap_closer.cpp
: 406)   Collecting gap candidates
  0:00:20.176    97M / 917M  INFO   GapCloser                (gap_closer.cpp
: 410)   Total 113 tips collected, total 159 connection candidates
  0:00:20.176    97M / 917M  INFO   GapCloser                (gap_closer.cpp
: 431)   Closing short gaps complete: filled 2 gaps after checking 157 candidates
  0:00:20.181    97M / 917M  INFO    General                 (gap_closer.cpp
: 495)   Gap closer done
  0:00:20.192    71M / 917M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification Cleanup (id: simplification_cleanup)
  0:00:20.192    71M / 917M  INFO    General                 (simplification.cpp
: 189)   PROCEDURE == Post simplification
  0:00:20.192    71M / 917M  INFO    General
(graph_simplification.hpp  : 455)   Disconnection of relatively low covered edges
disabled
  0:00:20.192    71M / 917M  INFO    General
(graph_simplification.hpp  : 494)   Complex tip clipping disabled
  0:00:20.192    71M / 917M  INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:20.192    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.198    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.198    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.204    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:20.204    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:20.210    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:20.210    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:20.216    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:20.216    71M / 917M  INFO    General                 (simplification.cpp
: 348)   Disrupting self-conjugate edges
  0:00:20.232    71M / 917M  INFO   Simplification
(parallel_processing.hpp   : 168)   Running Removing isolated edges
  0:00:20.292    70M / 917M  INFO   Simplification
(parallel_processing.hpp   : 171)   Removing isolated edges triggered 68397 times
  0:00:20.293    68M / 917M  INFO    General                 (simplification.cpp
: 358)   Removing all the edges having coverage 6.25657 and less
  0:00:20.300    67M / 917M  INFO    General                 (simplification.cpp
: 508)   After simplification:
  0:00:20.300    67M / 917M  INFO    General                 (simplification.cpp
: 509)     Average coverage = 33.837
  0:00:20.301    67M / 917M  INFO    General                 (simplification.cpp
: 510)     Total length = 1230327
  0:00:20.302    67M / 917M  INFO    General                 (simplification.cpp
: 511)     Median edge length: 688608
  0:00:20.302    67M / 917M  INFO    General                 (simplification.cpp
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: 512)     Edges: 588
  0:00:20.302    67M / 917M  INFO    General                 (simplification.cpp
: 513)     Vertices: 400
  0:00:20.302    67M / 917M  INFO   StageManager             (stage.cpp
: 189)   STAGE == Contig Output (id: contig_output)
  0:00:20.302    67M / 917M  INFO    General                 (read_converter.cpp
: 135)   Outputting contigs to
"/home/jmaciejewski/Lab1/spades/K55/simplified_contigs"
  0:00:20.305    71M / 917M  INFO    General                 (binary_converter.cpp
: 143)   294 reads written
  0:00:20.307    67M / 917M  INFO    General                 (pipeline.cpp
: 292)   SPAdes finished
  0:00:20.377     1M / 917M  INFO    General                 (main.cpp
: 131)   Assembling time: 0 hours 0 minutes 20 seconds

===== K55 finished.


===== K77 started.


== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/spades-core
/home/jmaciejewski/Lab1/spades/K77/configs/config.info
/home/jmaciejewski/Lab1/spades/K77/configs/isolate_mode.info

  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K77/configs/config.info"
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
:  94)   Loaded config from
"/home/jmaciejewski/Lab1/spades/K77/configs/isolate_mode.info"
  0:00:00.000     1M / 21M   INFO    General                 (memory_limit.cpp
:  55)   Memory limit set to 250 Gb
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 102)   Starting SPAdes, built from N/A, git revision N/A
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 103)   Maximum k-mer length: 128
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 104)   Assembling dataset ("/home/jmaciejewski/Lab1/spades/dataset.info") with
K=77
  0:00:00.000     1M / 21M   INFO    General                 (main.cpp
: 105)   Maximum # of threads to use (adjusted due to OMP capabilities): 5
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 212)   SPAdes started
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 225)   Starting from stage: read_conversion
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 234)   Two-step repeat resolution disabled
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 689)   Graph created, vertex min_id: 3, edge min_id: 3
  0:00:00.000     1M / 21M   INFO   GraphCore                (graph_core.hpp
: 690)   Vertex size: 48, edge size: 40
  0:00:00.000     1M / 21M   INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:00.000     1M / 21M   INFO    General                 (pipeline.cpp
: 245)   Will need read mapping, kmer mapper will be attached
  0:00:00.000     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == Binary Read Conversion (id: read_conversion)
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
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:  57)   Binary reads detected
  0:00:00.000     1M / 21M   INFO    General                 (read_converter.cpp
:  57)   Binary reads detected
  0:00:00.001     1M / 21M   INFO   StageManager             (stage.cpp
: 189)   STAGE == de Bruijn graph construction (id: construction)
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 115)   Contigs from previous K will be used:
/home/jmaciejewski/Lab1/spades/K55/simplified_contigs
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 150)   Max read length 151
  0:00:00.001     1M / 21M   INFO    General                 (construction.cpp
: 156)   Average read length 146.924
  0:00:00.001     1M / 21M   INFO    General                 (stage.cpp
: 121)   PROCEDURE == k+1-mer counting (id: construction:kpomer_counting)
  0:00:00.001     1M / 21M   INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:00.001     1M / 21M   INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:00.001     1M / 21M   INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 447392
  0:00:01.281  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 128)   Processed 1106756 reads
  0:00:01.281     1M / 1018M INFO    General                 (kmer_splitters.hpp
: 134)   Used 1106756 reads
  0:00:01.317     1M / 1018M INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:01.373     1M / 1018M INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 8337225 kmers in
total.
  0:00:01.374     1M / 1018M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Extension index construction (id:
construction:extension_index_construction)
  0:00:01.374     1M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 453)   Building kmer index
  0:00:01.374     1M / 1018M INFO    General
(kmer_index_builder.hpp    : 258)   Splitting kmer instances into 50 files using 5
threads. This might take a while.
  0:00:01.374     1M / 1018M INFO    General                 (file_limit.hpp
:  43)   Open file limit set to 1024
  0:00:01.374     1M / 1018M INFO    General                 (kmer_splitter.hpp
:  94)   Memory available for splitting buffers: 16.6666 Gb
  0:00:01.374     1M / 1018M INFO    General                 (kmer_splitter.hpp
: 102)   Using cell size of 447392
  0:00:02.013  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 197)   Processed 8337225 kmers
  0:00:02.013  3001M / 3001M INFO    General                 (kmer_splitters.hpp
: 202)   Used 8337225 kmers.
  0:00:02.013     1M / 1018M INFO    General
(kmer_index_builder.hpp    : 264)   Starting k-mer counting.
  0:00:02.086     1M / 1018M INFO    General
(kmer_index_builder.hpp    : 275)   K-mer counting done. There are 8417129 kmers in
total.
  0:00:02.086     1M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:02.294     8M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 8417129 kmers, 6117032 bytes
```

```
occupied (5.81389 bits per kmer).
  0:00:02.294     8M / 1018M INFO    General
(kmer_index_builder.hpp    : 168)   Merging final buckets.
  0:00:02.521    17M / 1018M INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 101)   Building k-mer extensions from k+1-mers
  0:00:03.165    17M / 1018M INFO   DeBruijnExtensionIndexBu
(kmer_extension_index_build: 106)   Building k-mer extensions from k+1-mers
finished.
  0:00:03.174    17M / 1018M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Condensing graph (id: construction:graph_condensing)
  0:00:03.175    17M / 1018M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 381)   Extracting unbranching paths
  0:00:03.954    25M / 1018M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 400)   Extracting unbranching paths finished. 147211
sequences extracted
  0:00:04.454    25M / 1018M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 336)   Collecting perfect loops
  0:00:04.623    25M / 1018M INFO   UnbranchingPathExtractor
(debruijn_graph_constructor: 369)   Collecting perfect loops finished. 4 loops
collected
  0:00:04.637    25M / 1018M INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 586)   Sorting edges...
  0:00:04.646    25M / 1018M INFO   DeBruijnGraphConstructor
(debruijn_graph_constructor: 588)   Edges sorted
  0:00:04.646    25M / 1018M INFO    General
(debruijn_graph_constructor: 516)   Total 294430 edges to create
  0:00:04.646    37M / 1018M INFO    General
(debruijn_graph_constructor: 519)   Collecting link records
  0:00:04.739    42M / 1018M INFO    General
(debruijn_graph_constructor: 521)   Ordering link records
  0:00:04.747    42M / 1018M INFO    General
(debruijn_graph_constructor: 524)   Sorting done
  0:00:04.750    44M / 1018M INFO    General
(debruijn_graph_constructor: 537)   Sorting LinkRecords...
  0:00:04.757    44M / 1018M INFO    General
(debruijn_graph_constructor: 540)   LinkRecords sorted
  0:00:04.757    44M / 1018M INFO    General
(debruijn_graph_constructor: 542)   Total 227119 vertices to create
  0:00:04.757    65M / 1018M INFO    General
(debruijn_graph_constructor: 545)   Connecting the graph
  0:00:04.932    56M / 1018M INFO    General                 (stage.cpp
: 121)   PROCEDURE == Filling coverage indices (PHM) (id:
construction:coverage_filling_phm)
  0:00:04.932    56M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:05.136    63M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 8337225 kmers, 6059096 bytes
occupied (5.81402 bits per kmer).
  0:00:05.156    95M / 1018M INFO    General
(coverage_hash_map_builder.:  49)   Collecting k-mer coverage information from
reads, this takes a while.
  0:00:06.709    95M / 1018M INFO    General                 (construction.cpp
: 427)   Filling coverage and flanking coverage from PHM
  0:00:07.278    95M / 1018M INFO    General                 (coverage_filling.hpp
:  83)   Processed 294429 edges
  0:00:07.357    40M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == EC Threshold Finding (id: ec_threshold_finder)
  0:00:07.361    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 182)   Kmer coverage valley at: 6
```

```
  0:00:07.361    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 202)   K-mer histogram maximum: 22
  0:00:07.361    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 238)   Estimated median coverage: 24. Coverage mad:
8.8956
  0:00:07.361    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 260)   Fitting coverage model
  0:00:07.388    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 2
  0:00:07.470    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 4
  0:00:07.737    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 8
  0:00:08.228    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 296)   ... iteration 16
  0:00:08.538    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 310)   Fitted mean coverage: 24.6754. Fitted coverage
std. dev: 7.80649
  0:00:08.539    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 335)   Probability of erroneous kmer at valley:
0.0064256
  0:00:08.539    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 359)   Preliminary threshold calculated as: 6
  0:00:08.539    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 363)   Threshold adjusted to: 6
  0:00:08.539    40M / 1018M INFO    General
(kmer_coverage_model.cpp   : 376)   Estimated genome size (ignoring repeats):
1243507
  0:00:08.539    40M / 1018M INFO    General
(genomic_info_filler.cpp   :  56)   Mean coverage was calculated as 24.6754
  0:00:08.539    40M / 1018M INFO    General
(genomic_info_filler.cpp   :  71)   EC coverage threshold value was calculated as 6
  0:00:08.539    40M / 1018M INFO    General
(genomic_info_filler.cpp   :  72)   Trusted kmer low bound: 4.7592
  0:00:08.539    40M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Gap Closer (id: early_gapcloser)
  0:00:08.545    53M / 1018M INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:08.572    58M / 1018M INFO    General                 (gap_closer.cpp
: 102)   Total edges in tip neighborhood: 196406 out of 294429, length: 12948979
  0:00:08.581    59M / 1018M INFO    General                 (edge_index.hpp
: 196)   Using small index (max_id = 295905)
  0:00:08.646    59M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:09.146    65M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 6978924 kmers, 5041352 bytes
occupied (5.77894 bits per kmer).
  0:00:09.182   121M / 1018M INFO    General
(edge_index_builders.hpp   : 266)   Collecting edge information from graph, this
takes a while.
  0:00:09.469   119M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:00:11.079   123M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:00:11.132    68M / 1018M INFO    General                 (gap_closer.cpp
: 491)   Initializing gap closer
  0:00:11.132    68M / 1018M INFO   GapCloser               (gap_closer.cpp
: 406)   Collecting gap candidates
  0:00:11.150    68M / 1018M INFO   GapCloser               (gap_closer.cpp
```

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: 410)   Total 917 tips collected, total 990 connection candidates
  0:00:11.154    68M / 1018M INFO   GapCloser                (gap_closer.cpp
: 431)   Closing short gaps complete: filled 53 gaps after checking 900 candidates
  0:00:11.161    68M / 1018M INFO    General                 (gap_closer.cpp
: 495)   Gap closer done
  0:00:11.170    40M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Raw Simplification (id: raw_simplification)
  0:00:11.170    40M / 1018M INFO    General                 (simplification.cpp
: 129)   PROCEDURE == Initial cleaning
  0:00:11.170    40M / 1018M INFO    General                 (simplification.cpp
:  63)   Most init cleaning disabled on main iteration
  0:00:11.170    40M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Self conjugate edge remover
  0:00:11.180    40M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Self conjugate edge remover triggered 0 times
  0:00:11.180    40M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification (id: simplification)
  0:00:11.180    40M / 1018M INFO    General                 (simplification.cpp
: 397)   Graph simplification started
  0:00:11.180    40M / 1018M INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:11.180    40M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 1
  0:00:11.180    40M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.340    39M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 29698 times
  0:00:11.340    39M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.450    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 295 times
  0:00:11.450    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.457    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:11.457    43M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 2
  0:00:11.457    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.458    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 8 times
  0:00:11.458    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.458    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:11.458    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.471    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 1273 times
  0:00:11.471    43M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 3
  0:00:11.471    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.472    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 168 times
  0:00:11.472    43M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.531    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 136 times
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  0:00:11.531    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.536    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 256 times
  0:00:11.537    44M / 1018M INFO    General                (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 4
  0:00:11.537    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.537    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 15 times
  0:00:11.537    44M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.574    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 85 times
  0:00:11.574    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.578    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 209 times
  0:00:11.578    45M / 1018M INFO    General                (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 5
  0:00:11.578    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.578    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 15 times
  0:00:11.578    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.628    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 125 times
  0:00:11.628    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.629    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 61 times
  0:00:11.629    47M / 1018M INFO    General                (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 6
  0:00:11.629    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.630    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1 times
  0:00:11.630    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 52 times
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 28 times
  0:00:11.648    47M / 1018M INFO    General                (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 7
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 1 times
  0:00:11.648    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.654    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 19 times
  0:00:11.654    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.654    47M / 1018M INFO   Simplification
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(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 11 times
  0:00:11.654    47M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 8
  0:00:11.654    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.654    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:11.654    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 11 times
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 9 times
  0:00:11.658    48M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 9
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:11.658    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 9 times
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 7 times
  0:00:11.660    48M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 10
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:11.660    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.662    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 6 times
  0:00:11.662    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.662    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 7 times
  0:00:11.662    48M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 11
  0:00:11.662    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.669    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 2 times
  0:00:11.669    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.677    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 5 times
  0:00:11.677    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:11.683    48M / 1018M INFO    General                 (simplification.cpp
: 402)   PROCEDURE == Simplification cycle, iteration 12
```

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  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Low coverage edge remover
  0:00:11.683    48M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Low coverage edge remover triggered 0 times
  0:00:11.687    47M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Gap Closer (id: late_gapcloser)
  0:00:11.691    60M / 1018M INFO    General                 (edge_index.hpp
: 132)   Size of edge index entries: 12/8
  0:00:11.713    64M / 1018M INFO    General                 (gap_closer.cpp
: 102)   Total edges in tip neighborhood: 165014 out of 165344, length: 12097106
  0:00:11.718    65M / 1018M INFO    General                 (edge_index.hpp
: 196)   Using small index (max_id = 295905)
  0:00:11.772    65M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:12.185    70M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 6093799 kmers, 4402064 bytes
occupied (5.77907 bits per kmer).
  0:00:12.214   118M / 1018M INFO    General
(edge_index_builders.hpp   : 266)   Collecting edge information from graph, this
takes a while.
  0:00:12.455   116M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:00:14.580   120M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:00:14.630    73M / 1018M INFO    General                 (gap_closer.cpp
: 491)   Initializing gap closer
  0:00:14.630    73M / 1018M INFO   GapCloser               (gap_closer.cpp
: 406)   Collecting gap candidates
  0:00:14.643    73M / 1018M INFO   GapCloser               (gap_closer.cpp
: 410)   Total 38 tips collected, total 41 connection candidates
  0:00:14.643    73M / 1018M INFO   GapCloser               (gap_closer.cpp
: 431)   Closing short gaps complete: filled 1 gaps after checking 40 candidates
  0:00:14.647    73M / 1018M INFO    General                 (gap_closer.cpp
: 495)   Gap closer done
  0:00:14.656    47M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Simplification Cleanup (id: simplification_cleanup)
  0:00:14.656    47M / 1018M INFO    General                 (simplification.cpp
: 189)   PROCEDURE == Post simplification
  0:00:14.656    47M / 1018M INFO    General
(graph_simplification.hpp  : 455)   Disconnection of relatively low covered edges
disabled
  0:00:14.656    47M / 1018M INFO    General
(graph_simplification.hpp  : 494)   Complex tip clipping disabled
  0:00:14.656    47M / 1018M INFO    General
(graph_simplification.hpp  : 646)   Creating parallel br instance
  0:00:14.656    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.663    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.663    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
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  0:00:14.669    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.669    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Tip clipper
  0:00:14.675    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Tip clipper triggered 0 times
  0:00:14.675    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Bulge remover
  0:00:14.681    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Bulge remover triggered 0 times
  0:00:14.681    47M / 1018M INFO    General                 (simplification.cpp
: 348)   Disrupting self-conjugate edges
  0:00:14.697    47M / 1018M INFO   Simplification
(parallel_processing.hpp   : 168)   Running Removing isolated edges
  0:00:14.757    45M / 1018M INFO   Simplification
(parallel_processing.hpp   : 171)   Removing isolated edges triggered 82395 times
  0:00:14.757    43M / 1018M INFO    General                 (simplification.cpp
: 358)   Removing all the edges having coverage 4.7592 and less
  0:00:14.759    43M / 1018M INFO    General                 (simplification.cpp
: 508)   After simplification:
  0:00:14.759    43M / 1018M INFO    General                 (simplification.cpp
: 509)     Average coverage = 25.388
  0:00:14.759    43M / 1018M INFO    General                 (simplification.cpp
: 510)     Total length = 1228389
  0:00:14.760    43M / 1018M INFO    General                 (simplification.cpp
: 511)     Median edge length: 688630
  0:00:14.760    43M / 1018M INFO    General                 (simplification.cpp
: 512)     Edges: 318
  0:00:14.760    43M / 1018M INFO    General                 (simplification.cpp
: 513)     Vertices: 228
  0:00:14.760    43M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Mismatch Correction (id: mismatch_correction)
  0:00:14.760    43M / 1018M INFO    General
(graph_pack_helpers.cpp    :  44)   Index refill
  0:00:14.760    43M / 1018M INFO    General                 (edge_index.hpp
: 175)   Using small index (max_id = 295905)
  0:00:14.788    43M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 410)   Building perfect hash indices
  0:00:14.922    44M / 1018M INFO   K-mer Index Building
(kmer_index_builder.hpp    : 446)   Index built. Total 1228389 kmers, 887944 bytes
occupied (5.78282 bits per kmer).
  0:00:14.923    54M / 1018M INFO    General
(edge_index_builders.hpp   : 253)   Collecting edge information from graph, this
takes a while.
  0:00:14.979    54M / 1018M INFO    General
(graph_pack_helpers.cpp    :  54)   Normalizing k-mer map. Total 118730 kmers to
process
  0:00:14.996    54M / 1018M INFO    General
(graph_pack_helpers.cpp    :  56)   Normalizing done
  0:00:14.996    54M / 1018M INFO    General
(mismatch_correction.cpp   : 392)   Collect potential mismatches
  0:00:15.024    54M / 1018M INFO    General
(mismatch_correction.cpp   : 193)   Total 156 edges (out of 318) with 7936
potential mismatch positions (50.8718 positions per edge)
  0:00:15.025    54M / 1018M INFO    General
(mismatch_correction.cpp   : 394)   Potential mismatches collected
  0:00:15.025    54M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:00:16.453    54M / 1018M INFO    General
```

```
(sequence_mapper_notifier.h:  85)   Processed 200000 reads
  0:00:16.462    55M / 1018M INFO    General
(sequence_mapper_notifier.h:  85)   Processed 400000 reads
  0:00:16.463    55M / 1018M INFO    General
(sequence_mapper_notifier.h:  85)   Processed 600000 reads
  0:00:16.476    56M / 1018M INFO    General
(sequence_mapper_notifier.h:  85)   Processed 800000 reads
  0:00:16.478    56M / 1018M INFO    General
(sequence_mapper_notifier.h:  85)   Processed 1000000 reads
  0:00:16.634    57M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 1106168 reads processed
  0:00:16.643    54M / 1018M INFO    General
(mismatch_correction.cpp   : 387)   All edges processed
  0:00:16.643    54M / 1018M INFO    General
(mismatch_correction.cpp   : 442)   Corrected 0 nucleotides
  0:00:16.643    54M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Contig Output (id: contig_output)
  0:00:16.643    54M / 1018M INFO    General                 (contig_output.hpp
:  20)   Outputting contigs to "/home/jmaciejewski/Lab1/spades/K77/before_rr.fasta"
  0:00:16.649    54M / 1018M INFO    General
(contig_output_stage.cpp   : 155)   Writing GFA graph to
"/home/jmaciejewski/Lab1/spades/K77/assembly_graph_after_simplification.gfa"
  0:00:16.654    54M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Hybrid Aligning (id: hybrid_aligning)
  0:00:16.654    54M / 1018M INFO   HybridAligning           (hybrid_aligning.cpp
: 346)   Hybrid library detected: #0
  0:00:16.654    54M / 1018M INFO    General                 (hybrid_aligning.cpp
: 299)   Aligning long reads with bwa-mem based aligner
  0:00:16.654    54M / 1018M INFO   BWAIndex                 (bwa_index.cpp
:  52)   Setting BWA alignment mode to 'pacbio'
  0:00:16.668    57M / 1018M INFO    General                 (bwa_index.cpp
: 150)   Using BWA IS algorithm
  0:00:17.863   300M / 1018M INFO    General                 (hybrid_aligning.cpp
: 279)   Prepared batch 0 of 7823 reads.
  0:02:58.595   300M / 1018M INFO    General                 (hybrid_aligning.cpp
: 241)   Read batch of size: 7823 processed; 7823 of them longer than 500; among
long reads aligned: 7733; paths of more than one edge received: 993
  0:02:58.596   300M / 1018M INFO    General                 (hybrid_aligning.cpp
: 284)   Processed 7823 reads
  0:02:58.614    57M / 1018M INFO    General                 (hybrid_aligning.cpp
: 313)   For library of long reads
  0:02:58.624    57M / 1018M INFO   StatsCounter
(pacbio_read_structures.hpp: 165)   Median fraction of present seeds in maximal
alignmnent among reads aligned to the graph: 0
  0:02:58.624    57M / 1018M INFO    General                 (hybrid_aligning.cpp
: 315)   Aligning of long reads finished
  0:02:58.624    54M / 1018M INFO   HybridAligning           (hybrid_aligning.cpp
: 393)   Padding gaps
  0:02:58.624    54M / 1018M INFO   HybridAligning           (hybrid_aligning.cpp
: 397)   Min gap weight set to 2
  0:02:58.624    54M / 1018M INFO    General                 (hybrid_aligning.cpp
: 151)   Closing gaps with long reads
  0:02:58.642    54M / 1018M INFO   MultiGapJoiner           (hybrid_gap_closer.hpp
: 559)   Closed 1 gaps
  0:02:58.657    54M / 1018M INFO    General                 (hybrid_aligning.cpp
: 172)   Closing gaps with long reads finished
  0:02:58.657    54M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Paired Information Counting (id: late_pair_info_count)
  0:02:58.660    54M / 1018M INFO    General
```

```
(graph_pack_helpers.cpp    :  54)   Normalizing k-mer map. Total 118730 kmers to
process
  0:02:58.660    54M / 1018M INFO    General
(graph_pack_helpers.cpp    :  56)   Normalizing done
  0:02:58.660    54M / 1018M INFO    General                 (pair_info_count.cpp
: 157)   Min edge length for estimation: 688630
  0:02:58.660    54M / 1018M INFO    General                 (pair_info_count.cpp
: 161)   Library #0 was mapped earlier on hybrid aligning stage, skipping
  0:02:58.660    54M / 1018M INFO    General                 (pair_info_count.cpp
: 168)   Estimating insert size for library #1
  0:02:58.660    54M / 1018M INFO    General                 (pair_info_count.cpp
:  41)   Selecting usual mapper
  0:02:58.660    54M / 1018M INFO    General                 (paired_info_utils.cpp
:  87)   Estimating insert size (takes a while)
  0:02:58.700   150M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:02:59.448   150M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:02:59.543   150M / 1018M INFO    General                 (paired_info_utils.cpp
: 104)   Edge pairs: 6301
  0:02:59.543   150M / 1018M INFO    General                 (paired_info_utils.cpp
: 106)   120583 paired reads (43.6039% of all) aligned to long edges
  0:02:59.544    54M / 1018M INFO    General                 (pair_info_count.cpp
: 188)     Insert size = 346.359, deviation = 122.998, left quantile = 203, right
quantile = 510, read length = 151
  0:02:59.545    54M / 1018M INFO    General                 (pair_info_count.cpp
: 203)   Filtering data for library #1
  0:02:59.545    54M / 1018M INFO    General                 (pair_info_count.cpp
:  41)   Selecting usual mapper
  0:02:59.545    54M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:03:00.175    54M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:03:00.175    54M / 1018M INFO    General                 (pair_info_count.cpp
: 207)   Mapping library #1
  0:03:00.175    54M / 1018M INFO    General                 (pair_info_count.cpp
: 209)   Mapping paired reads (takes a while)
  0:03:00.175    54M / 1018M INFO    General                 (pair_info_count.cpp
:  41)   Selecting usual mapper
  0:03:00.175    54M / 1018M INFO    General                 (paired_info_utils.cpp
: 138)   Left insert size quantile 203, right insert size quantile 510, filtering
threshold 2, rounding threshold 0
  0:03:00.180    67M / 1018M INFO    General
(sequence_mapper_notifier.h:  64)   Starting sequence mapping
  0:03:00.868    68M / 1018M INFO    General
(sequence_mapper_notifier.h: 103)   Total 276542 reads processed
  0:03:00.871    55M / 1018M INFO   StageManager             (stage.cpp
: 189)   STAGE == Distance Estimation (id: distance_estimation)
  0:03:00.871    55M / 1018M INFO    General
(distance_estimation.cpp   :  42)   Processing library #1
  0:03:00.871    55M / 1018M INFO    General
(distance_estimation_utils.: 133)   Weight Filter Done
  0:03:00.871    55M / 1018M INFO   DistanceEstimator
(distance_estimation.hpp   : 116)   Using SIMPLE distance estimator
  0:03:01.281    55M / 1018M INFO    General
(distance_estimation_utils.:  28)   Filtering info
  0:03:01.281    55M / 1018M INFO    General                 (pair_info_filters.hpp
: 243)   Start filtering; library index size: 11396
  0:03:01.283    55M / 1018M INFO    General                 (pair_info_filters.hpp
```

```
: 264)   Done filtering; library index size: 6602
  0:03:01.283    55M / 1018M INFO    General
(distance_estimation_utils.: 139)   Refining clustered pair information
  0:03:01.283    55M / 1018M INFO    General
(distance_estimation_utils.: 141)   The refining of clustered pair information has
been finished
  0:03:01.283    55M / 1018M INFO    General
(distance_estimation_utils.: 143)   Improving paired information
  0:03:01.293    55M / 1018M INFO   PairInfoImprover
(pair_info_improver.hpp    :  65)   Paired info stats: missing = 798;
contradictional = 28
  0:03:01.304    55M / 1018M INFO   PairInfoImprover
(pair_info_improver.hpp    :  65)   Paired info stats: missing = 102;
contradictional = 0
  0:03:01.304    55M / 1018M INFO    General
(distance_estimation_utils.:  86)   Filling scaffolding index
  0:03:01.305    55M / 1018M INFO   DistanceEstimator
(distance_estimation.hpp   : 116)   Using SMOOTHING distance estimator
  0:03:01.729    55M / 1018M INFO    General
(distance_estimation_utils.:  28)   Filtering info
  0:03:01.729    55M / 1018M INFO    General                (pair_info_filters.hpp
: 243)   Start filtering; library index size: 374
  0:03:01.729    55M / 1018M INFO    General                (pair_info_filters.hpp
: 264)   Done filtering; library index size: 374
  0:03:01.729    55M / 1018M INFO    General
(distance_estimation.cpp   :  51)   Clearing raw paired index
  0:03:01.729    54M / 1018M INFO   StageManager            (stage.cpp
: 189)   STAGE == Repeat Resolving (id: repeat_resolving)
  0:03:01.729    54M / 1018M INFO    General                (repeat_resolving.cpp
:  88)   Using Path-Extend repeat resolving
  0:03:01.729    54M / 1018M INFO    General                (launcher.cpp
: 603)   ExSPAnder repeat resolving tool started
  0:03:01.729    54M / 1018M INFO    General                (launcher.cpp
: 187)   Autodetecting unique edge set parameters...
  0:03:01.729    54M / 1018M INFO    General                (launcher.cpp
: 189)   Minimal unique edge length set to the smallest MP library IS: 2000
  0:03:01.730    54M / 1018M INFO    General
(coverage_uniformity_analyz:  25)   genomic coverage is 24.8974 calculated of
length 1213585
  0:03:01.731    54M / 1018M INFO    General                (launcher.cpp
: 194)   median coverage for edges longer than 2000 is 24.8974 uniformity 99%
  0:03:01.732    54M / 1018M INFO   ScaffoldingUniqueEdgeAna
(scaff_supplementary.cpp   :  76)   With length cutoff: 2000, median long edge
coverage: 25.3449, and maximal unique coverage: 0.5
  0:03:01.732    54M / 1018M INFO   ScaffoldingUniqueEdgeAna
(scaff_supplementary.cpp   :  79)   Unique edges quantity: 16, unique edges length
2418168, total edges length 2456666
  0:03:01.732    55M / 1018M INFO    General                (launcher.cpp
: 420)   Creating main extenders, unique edge length = 2000
  0:03:01.732    55M / 1018M INFO    General                (launcher.cpp
: 344)   filling path container
  0:03:01.733    55M / 1018M INFO    General                (extenders_logic.cpp
:  54)   resolvable_repeat_length_bound set to 369529
  0:03:01.745    55M / 1018M INFO    General                (extenders_logic.cpp
: 341)   Estimated coverage of library #1 is 25.388
  0:03:01.745    55M / 1018M INFO    General                (extenders_logic.cpp
: 352)   Creating extender; library index size: 8374
  0:03:01.745    55M / 1018M INFO    General                (extenders_logic.cpp
: 341)   Estimated coverage of library #1 is 25.388
```

```
  0:03:01.745    55M / 1018M INFO    General                 (extenders_logic.cpp
: 352)   Creating extender; library index size: 8374
  0:03:01.746    56M / 1018M INFO    General                 (extenders_logic.cpp
: 550)   Using 1 paired-end library
  0:03:01.746    56M / 1018M INFO    General                 (extenders_logic.cpp
: 551)   Using 1 paired-end scaffolding library
  0:03:01.746    56M / 1018M INFO    General                 (extenders_logic.cpp
: 552)   Using 1 single read library
  0:03:01.747    56M / 1018M INFO    General                 (launcher.cpp
: 387)   Filling backbone edges for long reads scaffolding...
  0:03:01.747    56M / 1018M INFO    General                 (launcher.cpp
: 406)    with coverage
  0:03:01.747    56M / 1018M INFO   ScaffoldingUniqueEdgeAna
(scaff_supplementary.cpp   :  76)   With length cutoff: 500, median long edge
coverage: 25.3449, and maximal unique coverage: 0.5
  0:03:01.747    56M / 1018M INFO   ScaffoldingUniqueEdgeAna
(scaff_supplementary.cpp   :  79)   Unique edges quantity: 26, unique edges length
2428648, total edges length 2456666
  0:03:01.747    56M / 1018M INFO    General                 (launcher.cpp
: 409)   26 unique edges
  0:03:01.747    56M / 1018M INFO    General                 (extenders_logic.cpp
: 427)   Creating scaffolding extender for lib 0
  0:03:01.747    56M / 1018M INFO   ExtensionChooser2015
(extension_chooser2015.hpp :  57)   ExtensionChooser2015 created
  0:03:01.748    56M / 1018M INFO    General                 (extenders_logic.cpp
: 453)   Using 1 long reads scaffolding library
  0:03:01.748    56M / 1018M INFO    General                 (launcher.cpp
: 449)   Total number of extenders is 5
  0:03:01.748    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 0 paths from 149 (0%)
  0:03:01.753    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 15 paths from 149 (10%)
  0:03:01.753    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 30 paths from 149 (20%)
  0:03:01.753    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 45 paths from 149 (30%)
  0:03:01.765    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 60 paths from 149 (40%)
  0:03:01.773    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 75 paths from 149 (50%)
  0:03:01.773    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 90 paths from 149 (60%)
  0:03:01.773    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 105 paths from 149 (70%)
  0:03:01.773    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 120 paths from 149 (80%)
  0:03:01.775    56M / 1018M INFO    General                 (path_extenders.cpp
:  34)   Processed 128 paths from 149 (85%)
  0:03:01.775    56M / 1018M INFO    General                 (path_extenders.cpp
:  36)   Processed 135 paths from 149 (90%)
  0:03:01.775    56M / 1018M INFO    General                 (launcher.cpp
: 252)   Finalizing paths
  0:03:01.775    56M / 1018M INFO    General                 (launcher.cpp
: 254)   Deduplicating paths
  0:03:01.776    55M / 1018M INFO    General                 (launcher.cpp
: 258)   Paths deduplicated
  0:03:01.776    55M / 1018M INFO   PEResolver               (pe_resolver.cpp
:  60)   Removing overlaps
  0:03:01.776    55M / 1018M INFO   PEResolver               (pe_resolver.cpp
```

```
:  63)   Sorting paths
  0:03:01.776    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  70)   Marking overlaps
  0:03:01.776    55M / 1018M INFO   OverlapRemover          (overlap_remover.hpp
: 117)   Marking start/end overlaps
  0:03:01.776    55M / 1018M INFO   OverlapRemover          (overlap_remover.hpp
: 120)   Marking remaining overlaps
  0:03:01.776    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  73)   Splitting paths
  0:03:01.776    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  78)   Deduplicating paths
  0:03:01.776    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  80)   Overlaps removed
  0:03:01.777    56M / 1018M INFO    General                (launcher.cpp
: 275)   Paths finalized
  0:03:01.777    56M / 1018M INFO    General                (launcher.cpp
: 456)   Closing gaps in paths
  0:03:01.777    56M / 1018M INFO    General                (launcher.cpp
: 486)   Gap closing completed
  0:03:01.777    55M / 1018M INFO    General                (launcher.cpp
: 304)   Traversing tandem repeats
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 314)   Traversed 0 loops
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 252)   Finalizing paths
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 254)   Deduplicating paths
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 258)   Paths deduplicated
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  60)   Removing overlaps
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  63)   Sorting paths
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  70)   Marking overlaps
  0:03:01.779    55M / 1018M INFO   OverlapRemover          (overlap_remover.hpp
: 117)   Marking start/end overlaps
  0:03:01.779    55M / 1018M INFO   OverlapRemover          (overlap_remover.hpp
: 120)   Marking remaining overlaps
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  73)   Splitting paths
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  78)   Deduplicating paths
  0:03:01.779    55M / 1018M INFO   PEResolver              (pe_resolver.cpp
:  80)   Overlaps removed
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 275)   Paths finalized
  0:03:01.779    55M / 1018M INFO    General                (launcher.cpp
: 666)   ExSPAnder repeat resolving tool finished
  0:03:01.780    54M / 1018M INFO   StageManager            (stage.cpp
: 189)   STAGE == Contig Output (id: contig_output)
  0:03:01.780    54M / 1018M INFO    General                (contig_output.hpp
:  20)   Outputting contigs to "/home/jmaciejewski/Lab1/spades/K77/before_rr.fasta"
  0:03:01.786    54M / 1018M INFO    General
(contig_output_stage.cpp   : 155)   Writing GFA graph to
"/home/jmaciejewski/Lab1/spades/K77/assembly_graph_with_scaffolds.gfa"
  0:03:01.792    54M / 1018M INFO    General
(contig_output_stage.cpp   : 169)   Outputting FastG graph to
"/home/jmaciejewski/Lab1/spades/K77/assembly_graph.fastg"
```

```
  0:03:01.807    54M / 1018M INFO    General
(contig_output_stage.cpp   : 200)   Breaking scaffolds
  0:03:01.810    56M / 1018M INFO    General
(contig_output_stage.cpp   : 101)   Outputting contigs to
/home/jmaciejewski/Lab1/spades/K77/final_contigs.fasta
  0:03:01.814    56M / 1018M INFO    General
(contig_output_stage.cpp   : 107)   Outputting FastG paths to
/home/jmaciejewski/Lab1/spades/K77/final_contigs.paths
  0:03:01.817    56M / 1018M INFO    General
(contig_output_stage.cpp   : 101)   Outputting contigs to
/home/jmaciejewski/Lab1/spades/K77/scaffolds.fasta
  0:03:01.821    56M / 1018M INFO    General
(contig_output_stage.cpp   : 107)   Outputting FastG paths to
/home/jmaciejewski/Lab1/spades/K77/scaffolds.paths
  0:03:01.821    56M / 1018M INFO    General
(contig_output_stage.cpp   : 114)   Populating GFA with scaffold paths
  0:03:01.821    54M / 1018M INFO    General                 (pipeline.cpp
: 292)   SPAdes finished
  0:03:01.832     1M / 1018M INFO    General                 (main.cpp
: 131)   Assembling time: 0 hours 3 minutes 1 seconds

===== K77 finished.


===== Copy files started.


== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/python3
/home/jmaciejewski/miniforge3/envs/micro/share/spades/spades_pipeline/scripts/
copy_files.py /home/jmaciejewski/Lab1/spades/K77/before_rr.fasta
/home/jmaciejewski/Lab1/spades/before_rr.fasta
/home/jmaciejewski/Lab1/spades/K77/assembly_graph_after_simplification.gfa
/home/jmaciejewski/Lab1/spades/assembly_graph_after_simplification.gfa
/home/jmaciejewski/Lab1/spades/K77/final_contigs.fasta
/home/jmaciejewski/Lab1/spades/contigs.fasta
/home/jmaciejewski/Lab1/spades/K77/first_pe_contigs.fasta
/home/jmaciejewski/Lab1/spades/first_pe_contigs.fasta
/home/jmaciejewski/Lab1/spades/K77/strain_graph.gfa
/home/jmaciejewski/Lab1/spades/strain_graph.gfa
/home/jmaciejewski/Lab1/spades/K77/scaffolds.fasta
/home/jmaciejewski/Lab1/spades/scaffolds.fasta
/home/jmaciejewski/Lab1/spades/K77/scaffolds.paths
/home/jmaciejewski/Lab1/spades/scaffolds.paths
/home/jmaciejewski/Lab1/spades/K77/assembly_graph_with_scaffolds.gfa
/home/jmaciejewski/Lab1/spades/assembly_graph_with_scaffolds.gfa
/home/jmaciejewski/Lab1/spades/K77/assembly_graph.fastg
/home/jmaciejewski/Lab1/spades/assembly_graph.fastg
/home/jmaciejewski/Lab1/spades/K77/final_contigs.paths
/home/jmaciejewski/Lab1/spades/contigs.paths


===== Copy files finished.


===== Assembling finished.


===== Breaking scaffolds started.
```

```
== Running: /home/jmaciejewski/miniforge3/envs/micro/bin/python3
/home/jmaciejewski/miniforge3/envs/micro/share/spades/spades_pipeline/scripts/
breaking_scaffolds_script.py --result_scaffolds_filename
/home/jmaciejewski/Lab1/spades/scaffolds.fasta --misc_dir
/home/jmaciejewski/Lab1/spades/misc --threshold_for_breaking_scaffolds 3


===== Breaking scaffolds finished.


===== Terminate started.


===== Terminate finished.

 * Assembled contigs are in /home/jmaciejewski/Lab1/spades/contigs.fasta
 * Assembled scaffolds are in /home/jmaciejewski/Lab1/spades/scaffolds.fasta
 * Paths in the assembly graph corresponding to the contigs are in
/home/jmaciejewski/Lab1/spades/contigs.paths
 * Paths in the assembly graph corresponding to the scaffolds are in
/home/jmaciejewski/Lab1/spades/scaffolds.paths
 * Assembly graph is in /home/jmaciejewski/Lab1/spades/assembly_graph.fastg
 * Assembly graph in GFA format is in
/home/jmaciejewski/Lab1/spades/assembly_graph_with_scaffolds.gfa

======= SPAdes pipeline finished.

SPAdes log can be found here: /home/jmaciejewski/Lab1/spades/spades.log

Thank you for using SPAdes! If you use it in your research, please cite:

  Prjibelski, A., Antipov, D., Meleshko, D., Lapidus, A. and Korobeynikov, A.,
2020. Using SPAdes de novo assembler. Current protocols in bioinformatics, 70(1),
p.e102.
  doi.org/10.1002/cpbi.102
```