TODO

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1 TODO

2 Start report (NO)

3 Profiling

- profile R (AK)

- profile valgrind (NO)

- Baseline profiling (AK)

4 Easy solutions with omp critical

- omp critical -> omp atomic write/update? (AK)

- profile again

5 Misc tests

- change from dynamic to static

- if keep critical consider naming them (possible speedup) (AK)

- what does nowait do? speedup? (NO)

6 Reporting structure improvements

- Can summary$pt and summary$prev be merged? $prev and $pt are almost identical $pt allocates patient-time whereas $prev allocates number of individuals, all other columns are identical and their sizes seems to be very similar. !suggest a single structure with one more column.

```
> tmp <- callFhcrc(n=1e6)
user system elapsed
40.731 0.041 10.695
> dim(tmp$summary$pt)
122175 8
> dim(tmp$summary$prev)
116545 8
```

- $events has one more factor, $event - the event type and does not fit in that structure.

- Could the dynamic mapping be changed for a static sparse structure? According to the table below it would be 432000x8 matrix. The sparsity would result in overhead (and look bad if not post-processed) with small simulations, but the static allocation could save overhead for large simulations (when it is needed).

state	grade	dx	psa	cohort	age	number of combinations
3	3	3	2	(1980-1900)	100	432 000

- A consequence of using a static structure maybe that openMP's reduction() could be used. After a quick web search: it looks like it does not operate directly on arrays.

7 Start testing on Povel

8 Optimizing flags / compilers

9 MPI? (if so on R-side, or?)

10 Instructions

10.1 Build & compile

Howto install and compile the R-package:
```
https://github.com/mclements/microsimulation
shell:  git clone https://github.com/mclements/microsimulation.git
R: install.packages(''BH'')
R: install.packages(''Rcpp'')
shell:  R CMD INSTALL path_to_microsimulation
```

10.1.1 Makevars

On Ferlin, the gcc compiler used for R is 4.6.0, which only has expereminetal support for C++11 standard. The flag to provide is -std=c++0x in lieu of -std=c++11.

10.2 Project instructions from PDC

10.2.1 For some application and HPC architecture of your choice:

- Develop efficient program for non-trivial problem

- Demonstrate and report how efficient it is.

- 4.5 ECTS = 3 weeks of work incl. report writing

10.2.2 The project is not about:

- Substantial development of new code.

- Scientific results obtained with code

10.2.3 So:

- Prioritize measurements and analysis/interpretation!

- Demonstrate use of tools (profiling, . . .) , and simple performance model.

- NO TIME for development of new significant code.

10.2.4 Examples:

- Parallelize a code you know and/or work with; choose interesting part.

- Write a simple code for key algorithm of bigger solution process

- Write a simple code for a simple problem

10.2.5 After the course

- Start the work ASAP:

- Finish the work; Get in touch with tutor

- Submit report to tutor. The report will be graded and sent back with comments; you may have to complete some parts and hand in again. We need email and paper mail address!

- KTH students: LADOK

- Other students: Certificate will be sent to you

10.2.6   Now - during lab-afternoons

- Discuss with instructors & course participants, form groups of size G.

- Define project and choose tutor: Michael, Jonathan, Erwin, Stefano

- Write very short synopsis, check with supervisor

- Submit synopsis to summer-info@pdc.kth.se before end of HPC course

10.3   Run valgrind from R

Howto run valgrind from shell:
```
   R --vanilla -d "valgrind --tool=memcheck --track-origins=yes"
< ~/src/ki/microsimulation/doc/RunSim.R
   R --vanilla -d "valgrind --tool=callgrind" < ~/src/ki/microsimulation/doc/RunSim.R
```

10.3.1   To explore and make callgrind readable:

- `https://github.com/jrfonseca/gprof2dot`

  - `gprof2dot -f callgrind < callgrind.out.18739 | dot -Tpng > profile.png` plot callgrind output
  - `gprof2dot -f callgrind < callgrind.out.18503 | dot -Tpdf > profile.pdf` plot to pdf
  - `gprof2dot -z callFhcrc -f callgrind < callgrind.out.4596 | dot -Tpdf > profile.pdf` set root function
  - `gprof2dot -s -z callFhcrc -f callgrind < callgrind.out.9822 | dot -Tpdf > profile.pdf` skip arguments to functions

- kCachgrind

11   Meetings with Erwin 20150504

11.1   Status of the PDC project

- old openMP with critical (where the reporting took ~70% of the time):

```
mySim <- callFhcrc(n 1e7, screen "noScreening")
user system elapsed
410.196 0.216 113.112
```

- openMP private reporting and then merging reports with one thread:

```
mySim <- callFhcrc(n 1e7, screen "noScreening")
user system elapsed
197.919 0.372 58.001
```

- change from static to dynamic

- un-ordered maps to ordered

- performance engineering (flags, compilers, chunk sizes etc)

12   Mailing with Rossen

Hi Rossen,

Great, we have already started.

We will get back to you if we find ourselves stuck.

Best, Andreas

On 09/23/2014 12:43 PM, Rossen Apostolov wrote:

Hi Andreas,

I will be your tutor/supervisor regarding your summer school project.

Let me know if you have problems with it or would like me to have a look at the results for evaluation.

Cheers, Rossen