SYNPLEX
A task-parallel scheme for the revised simplex method
(Part 2)

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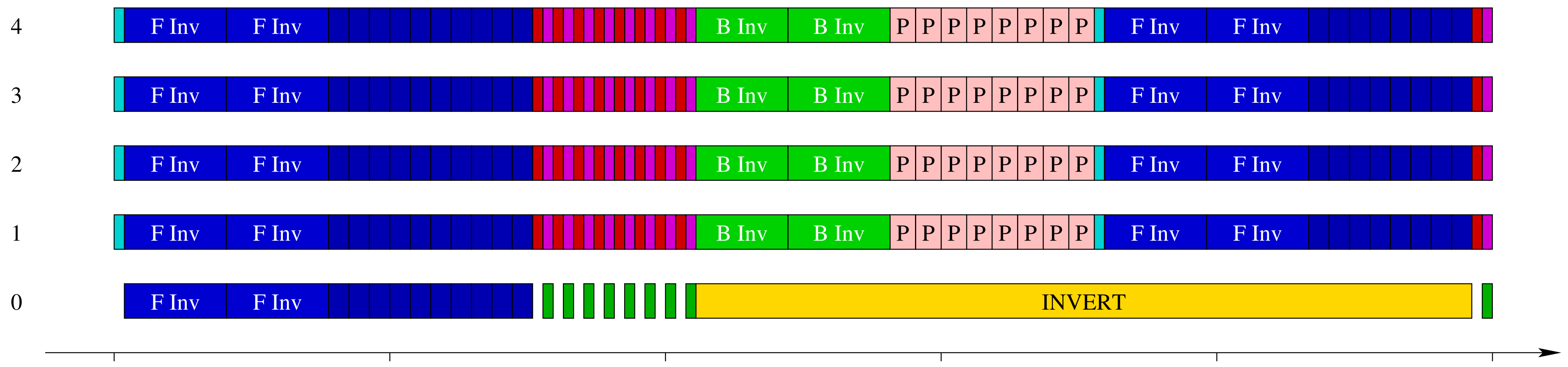

Data parallelism

When using $1 + p$ processors

- Rows distributed over p processors

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  - FTRAN for UPDATE etas
  - CHUZR
  - UPDATE tableau in minor iterations
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- Columns distributed over p processors for data parallel
  - PRICE
  - CHUZC

Data location challenge

- B_0 factored serially on one processor

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- Factors used serially on all processors to solve linear systems

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- Factors used serially on all processors to solve linear systems
- Each solution used for data parallel operations over all processors

Practical implementation

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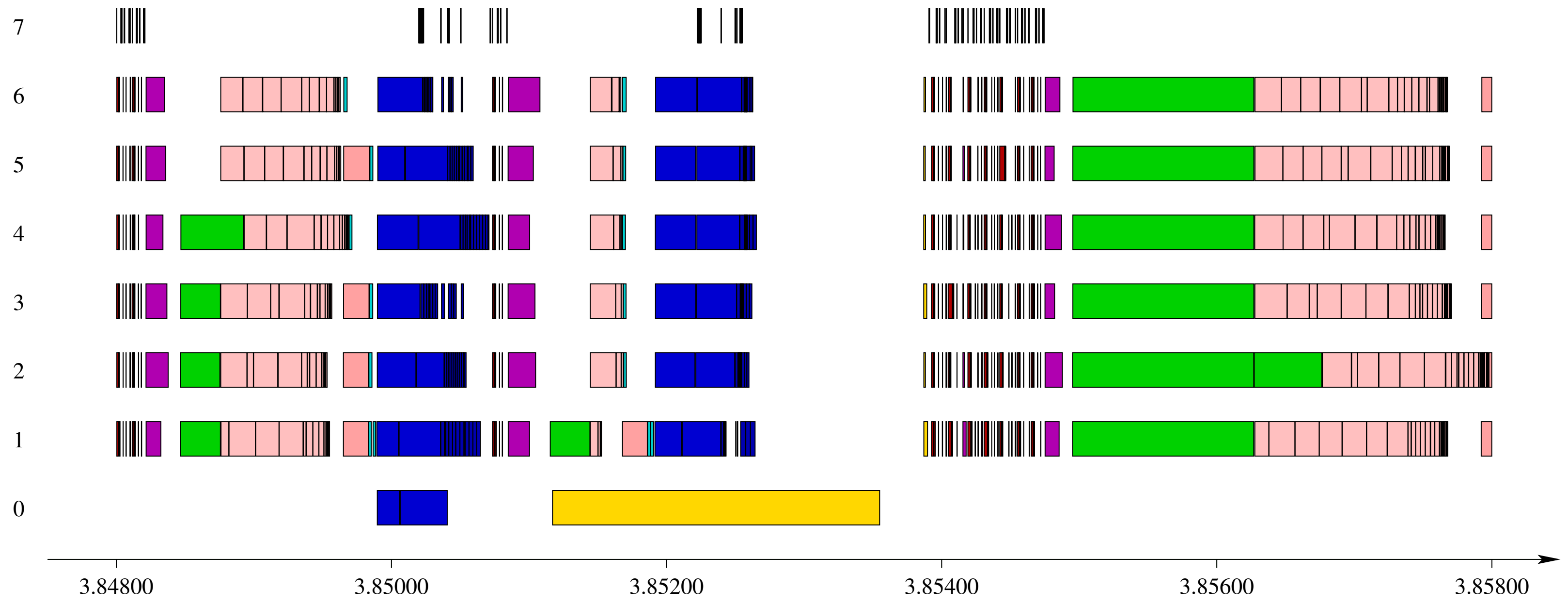
- Prevent different processors from writing to consecutive components
  - Insert “padding” between row partitions: implemented
  - Insert “padding” between column partitions: not yet implemented

Results

			1 Processor	Speed-up	
Model	Rows	Columns	CPU (s)	4 processors	8 processors
cre-a	3517	4067	5.76	1.16	1.83
25fv47	822	1571	8.78	1.54	1.99
greenbea	2393	5405	29.22	-	2.30
ken-11	14695	21349	41.26	1.40	2.52
stocfor3	16676	15695	98.44	1.50	2.76
pds-06	9882	28655	138.84	1.58	3.05

Poor performance: cre-a

Least speed-up (1.83) on 8 processors



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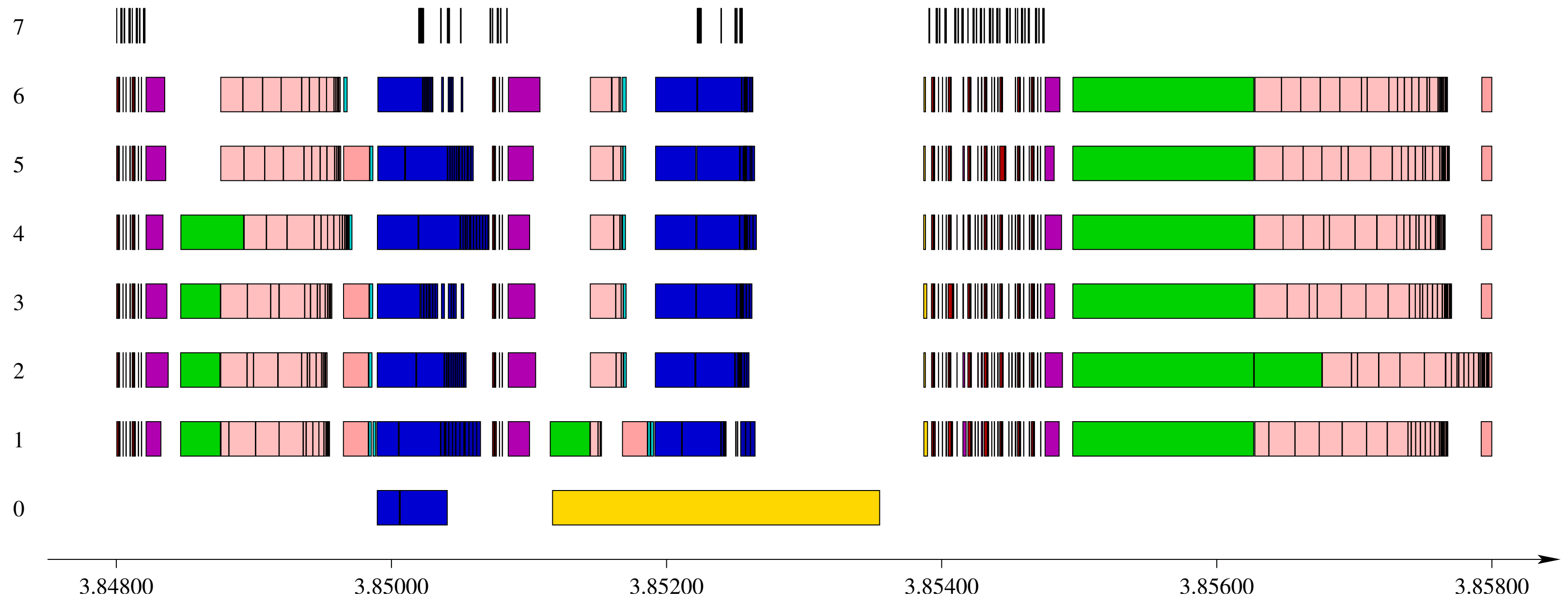

Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	3.29	-

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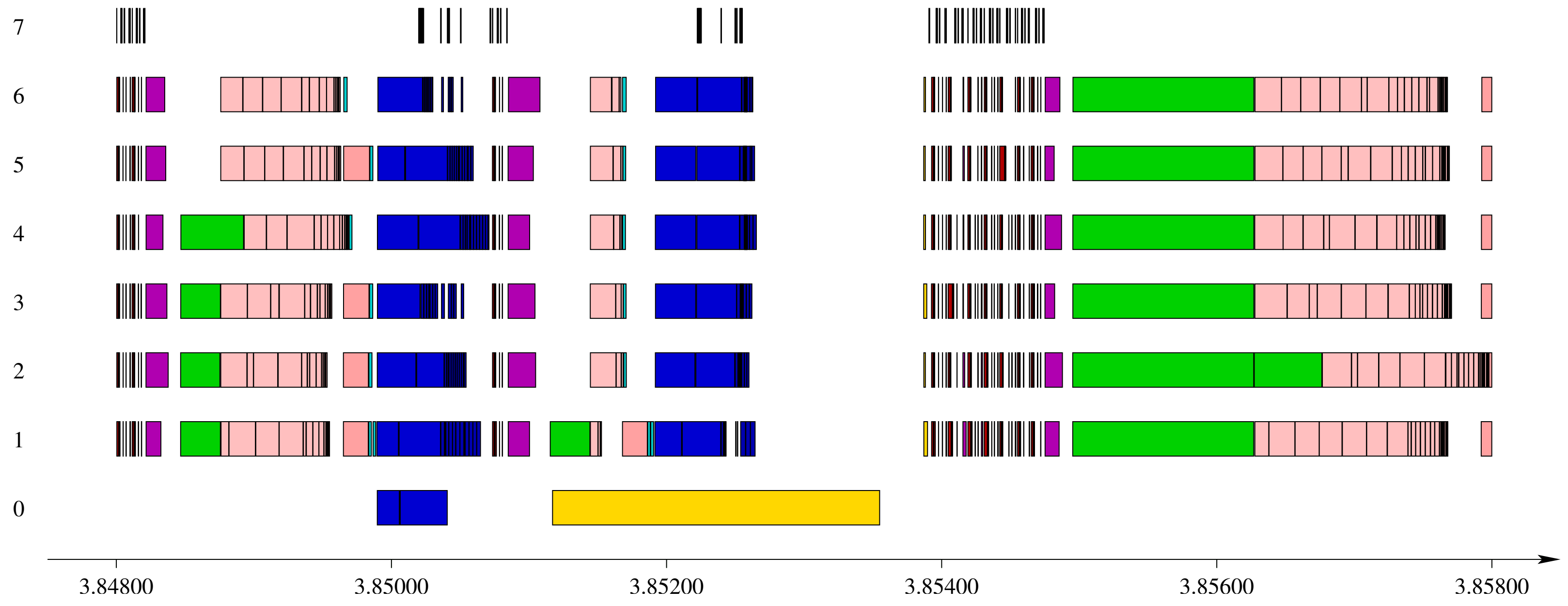

Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	3.29	-
Inv-BTRAN	2.11	-

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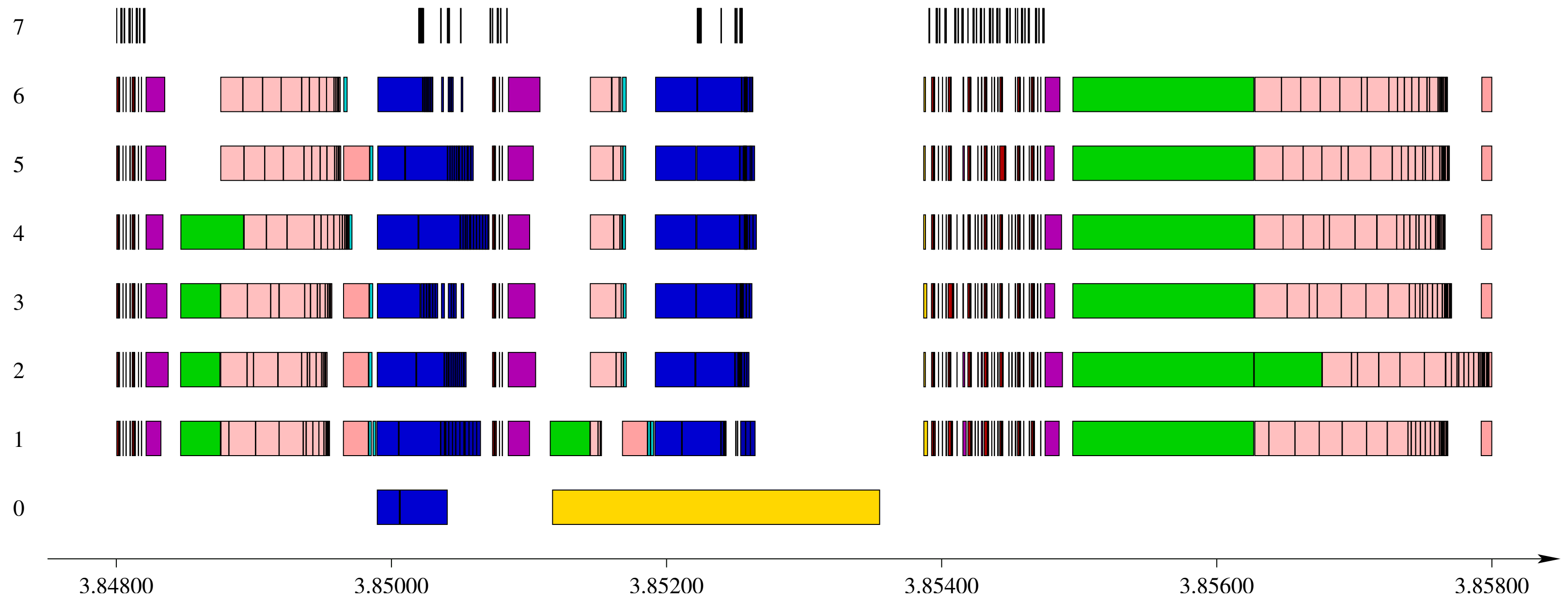
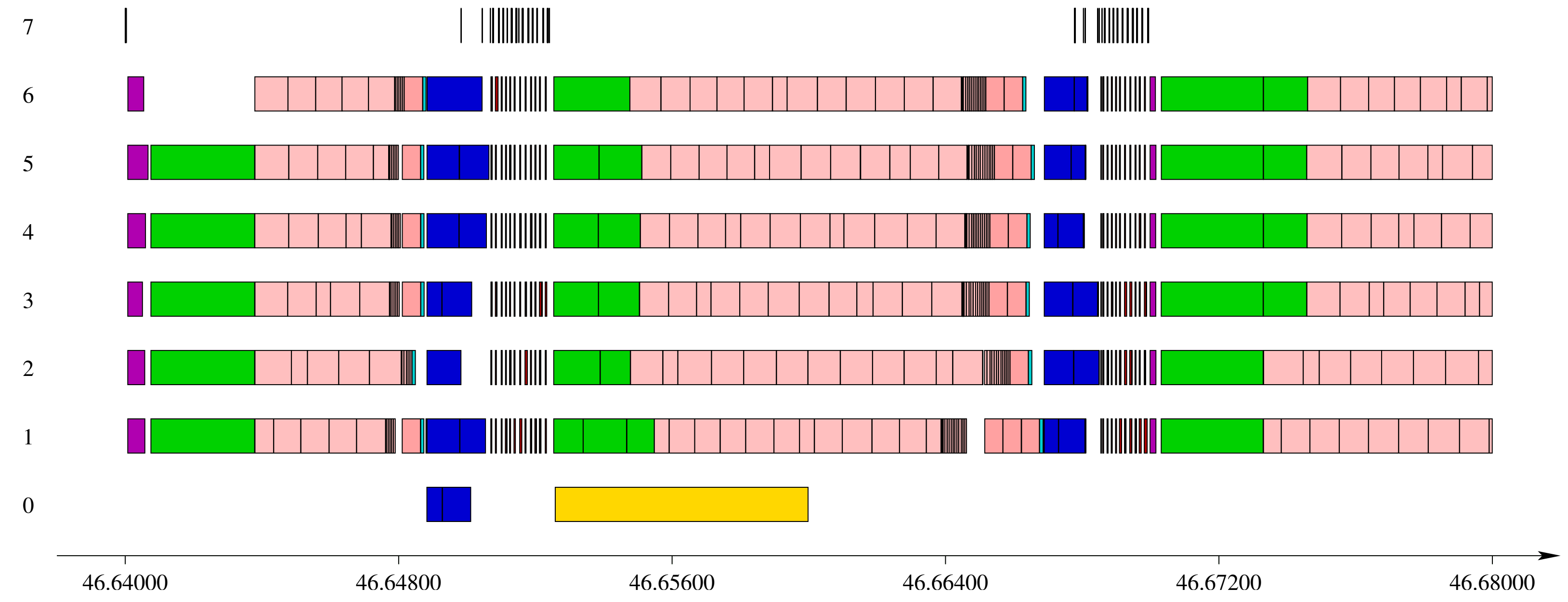


Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	3.29	-
Inv-BTRAN	2.11	-
PRICE	2.94	2.04

Fair performance: pds-06

Best speed-up (3.05) on 8 processors



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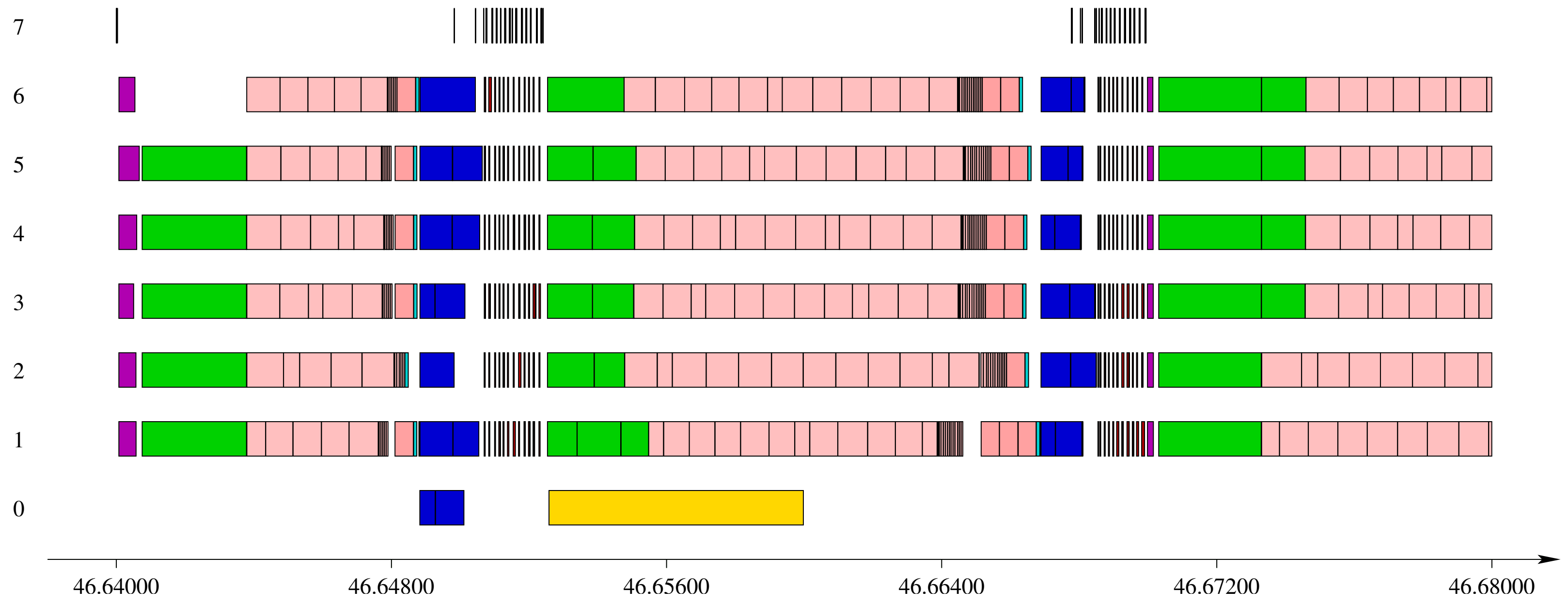

Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	2.02	-

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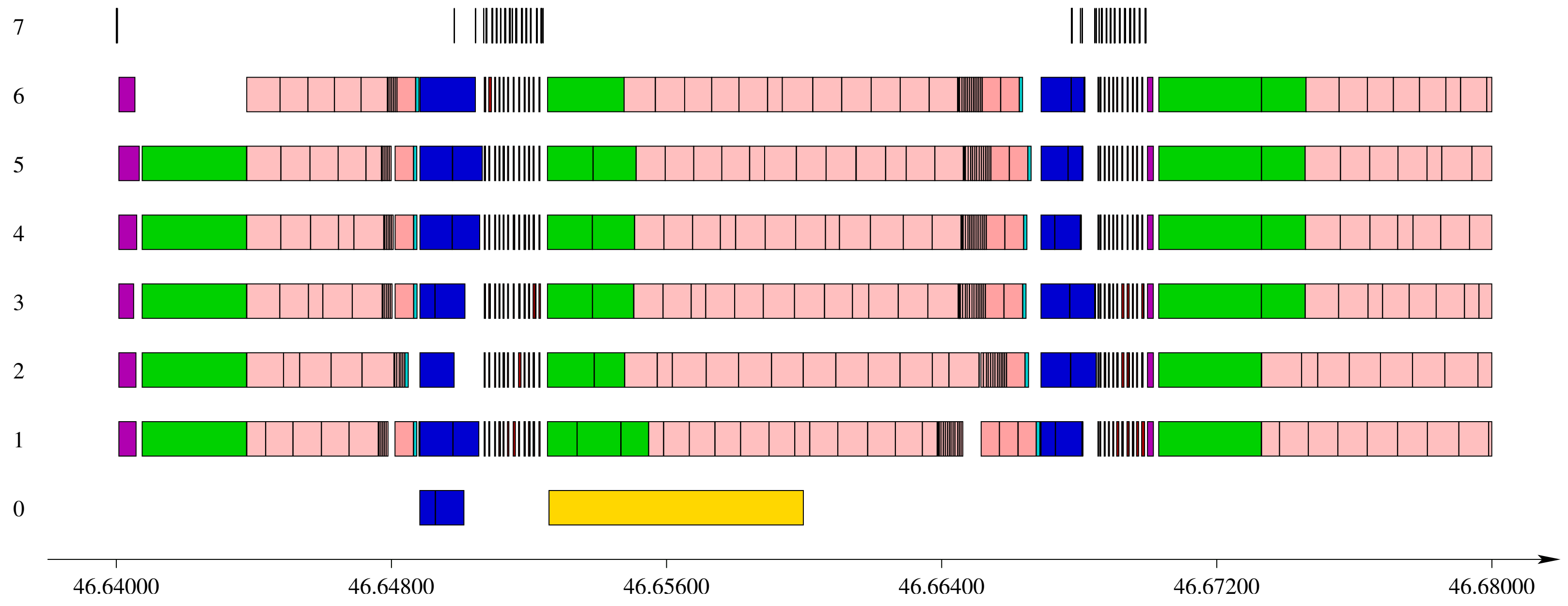

Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	2.02	-
Inv-BTRAN	1.79	-

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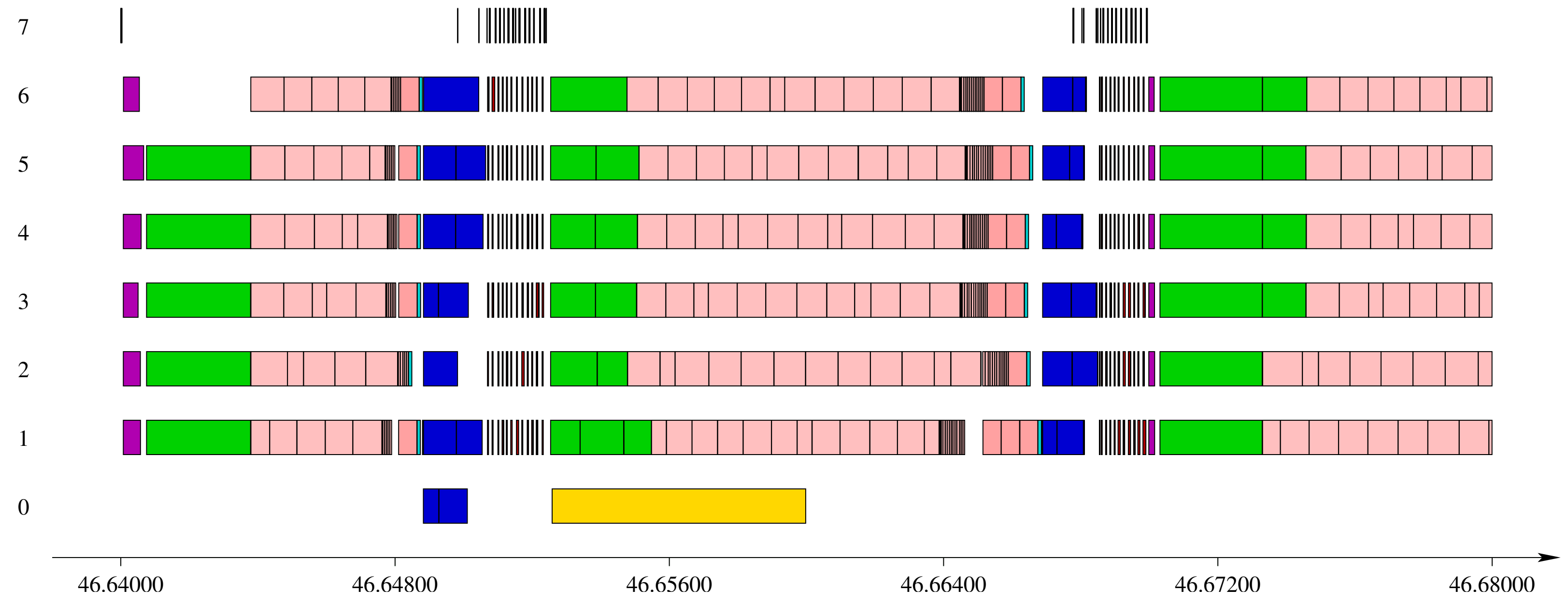

Operation	Slow-down in total time	Overall speed-up
Inv-FTRAN	2.02	-
Inv-BTRAN	1.79	-
PRICE	1.69	3.55

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Future prospects:

- Pure data parallel revised simplex *without* multiple pricing

Bibliography

Paper:	`http://www.maths.ed.ac.uk/hall/ParSimplex`
This talk:	`http://www.maths.ed.ac.uk/hall/CSC05`

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