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Debugging / Monitoring

Online vs offline

Online Tools

- Statistics
- Visual debugging

Offline Tools

- Trace-based analysis

Online Profiling Feeback

- Task/worker mapping stats
- Bus stats
- Additional stats (memory, MSI cache)
  - Configure-time options

```
$ export STARPU_PROFILE=1 STARPU_WORKER_STATS=1
$ my_program
...
```

Online Profiling Feeback

- Task/worker mapping stats
- Bus stats
- Additional stats (memory, MSI cache)
  - Configure-time options

```
$ export STARPU_PROFILE=1 STARPU_WORKER_STATS=1
$ my_program
...
```

```
$ export STARPU_PROFILE=1 STARPU_BUS_STATS=1
$ my_program
...
```

Online Profiling Feeback

- Task/worker mapping stats
- Bus stats
- Additional stats (memory, MSI cache)
  - Configure-time options

```
$ export STARPU_PROFILE=1 STARPU_WORKER_STATS=1
$ my_program
...
```

```
$ export STARPU_PROFILE=1 STARPU_BUS_STATS=1
$ my_program
...
```

```
$ $STARPU_DIR/configure --enable-stats --enable-memory-stats \
                        [... other opts ...]
...
```

Offline Trace-Based Feedback

- FxT trace collection
- Trace analysis and display
  - ViTE Gantt
  - Graphviz DAG
  - R plots

Offline Feedback – Trace Collection

- Requires FxT trace toolkit
- Compile-time option to enable trace collection
- Environment variable to enable trace post-processing

```
1 $ $STARPU_DIR/configure --with-fxt [... other opts ...]
2 ...
```

Offline Feedback – Trace Collection

- Requires FxT trace toolkit
- Compile-time option to enable trace collection
- Environment variable to enable trace post-processing

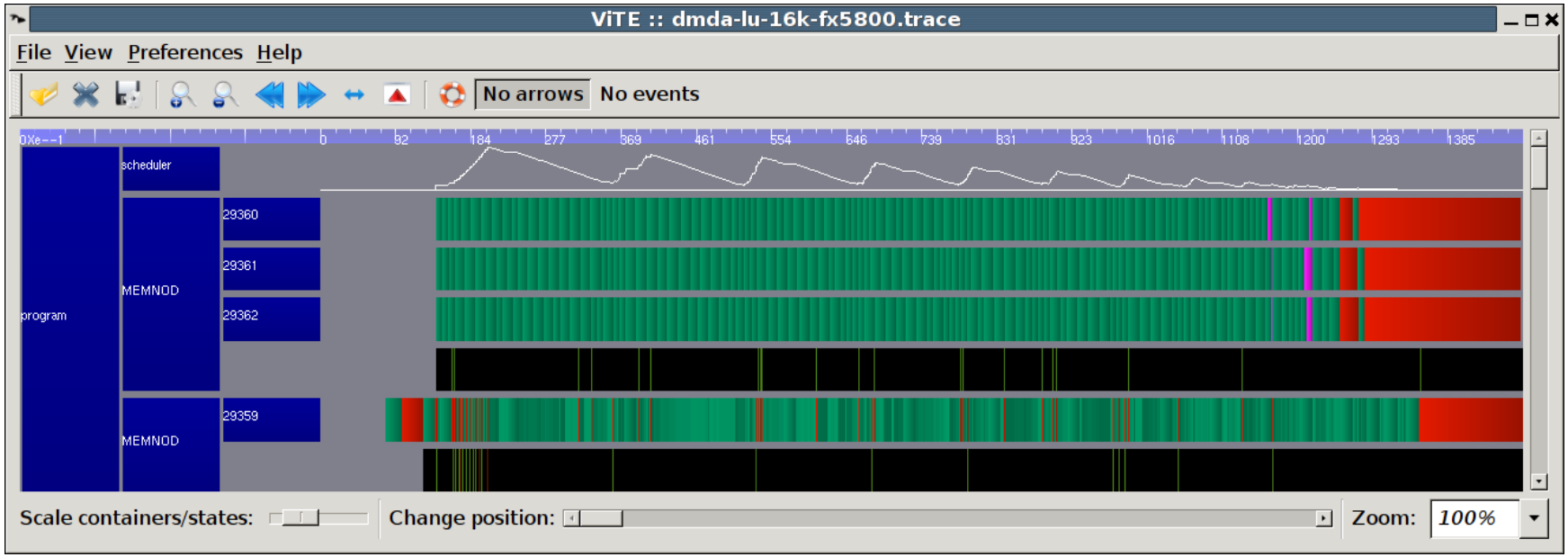
```
$ $STARPU_DIR/configure --with-fxt [... other opts ...]
...
```

```
$ export STARPU_GENERATE_TRACE=1
$ my_program
...
```

Offline Feedback – Trace Analysis

Automatically generated

- Dependency graph (DAG)
- Activity diagramm (GANTT)
  - Visualize with ViTE



Offline Feedback – Kernel Model

Display the codelet performance models recorded by StarPU

- Command-line tool starpu_perfmodel_display
- History-based models
- Regression-based models

Offline Feedback – Kernel Model

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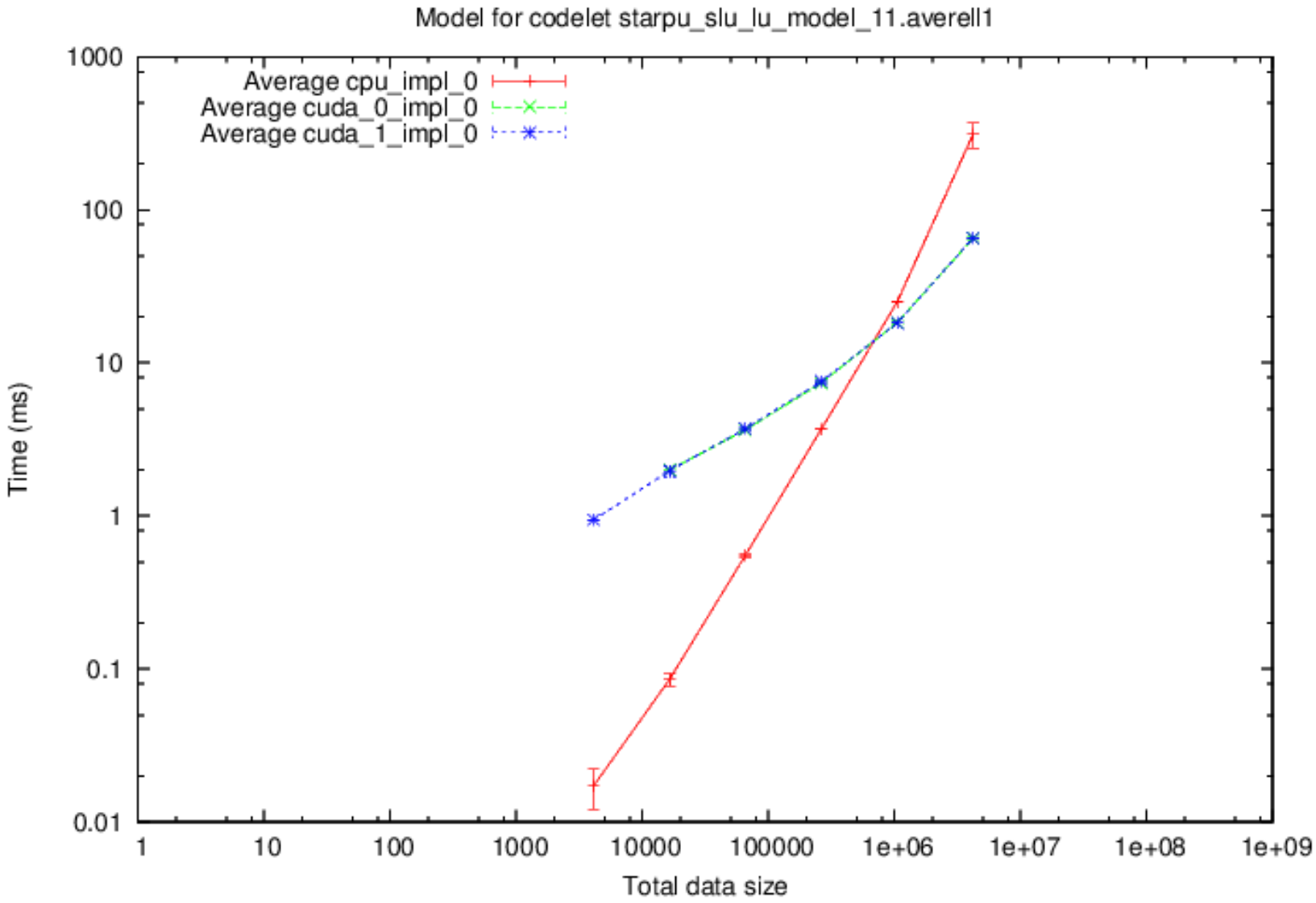
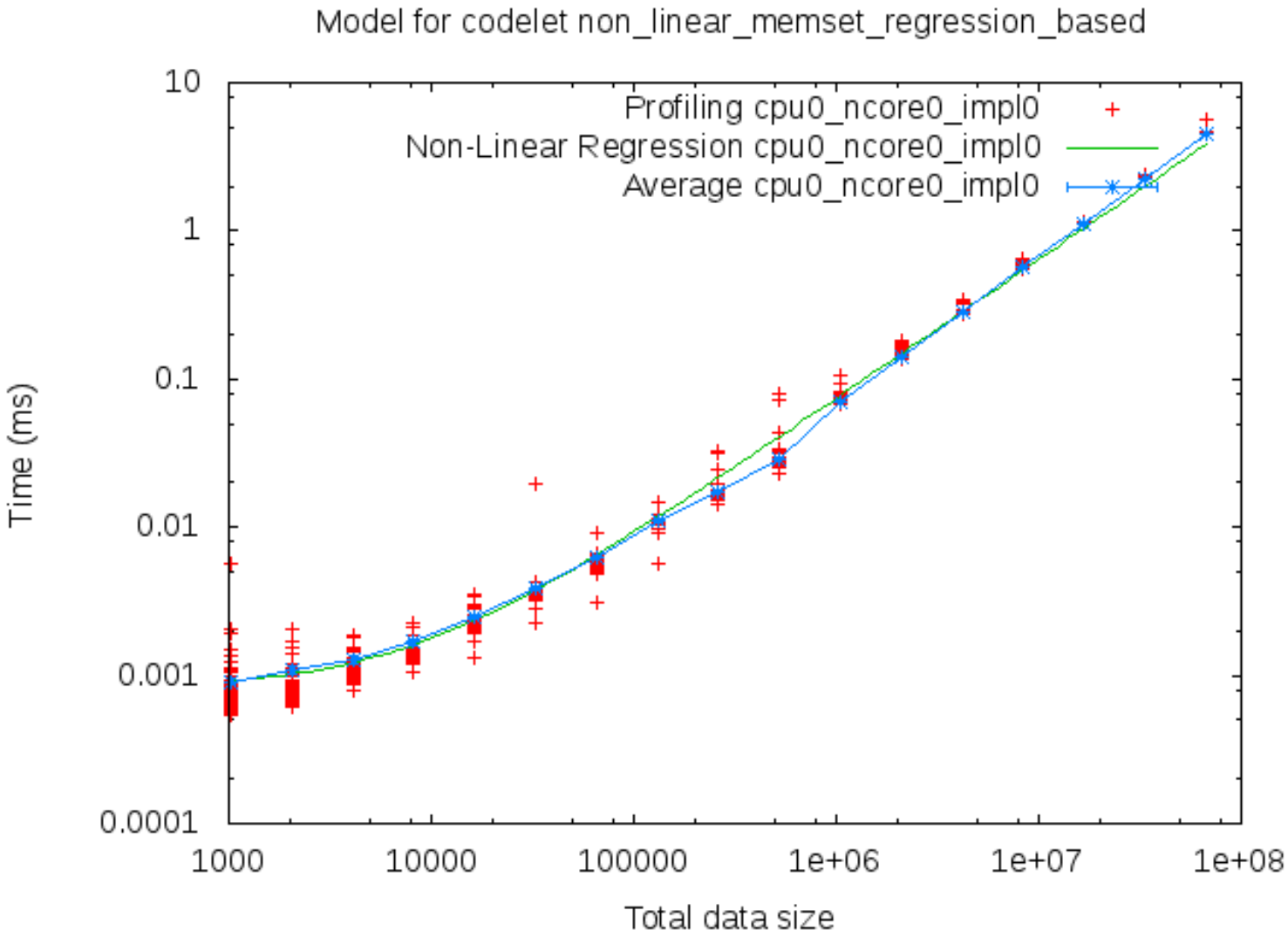
```
$ starpu_perfmodel_display -s starpu_slu_lu_model_11

performance model for cpu0_parallel1_impl0
# hash         size         mean (us)         stddev (us)       n
aa6d4ef7       4194304      3.055501e+05      5.804822e+04      48
```

Offline Feedback – Kernel Model Characteristics



Offline Feedback – Kernel Model Regression Fitness



Offline Feedback – Synthetic Kernels' Behaviour