Erganics: Predicting Expected Running Timing

Young-Kyoon Suh
Department of Computer Science
University of Arizona
`yksuh@cs.arizona.edu`

June 27, 2013

1 Environmental Settings

Experiment Parameters	Description
Chosen Work	Incrementing a dummy variable for a given expected runtime
# of Iterations at Each Expected Runtime	1000
Mode	Description
Socket Mode	Receives an expected running time in Java, pass it to and run dummy incremental work during the specified time in C program

Table 1: Experiment Background Description

2 Expected Running Times

2.1 1 Second

2.1.1 Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	1034	1156	1039.0	1039.9	6.07

Table 2: Measured time statistics on 1-sec work
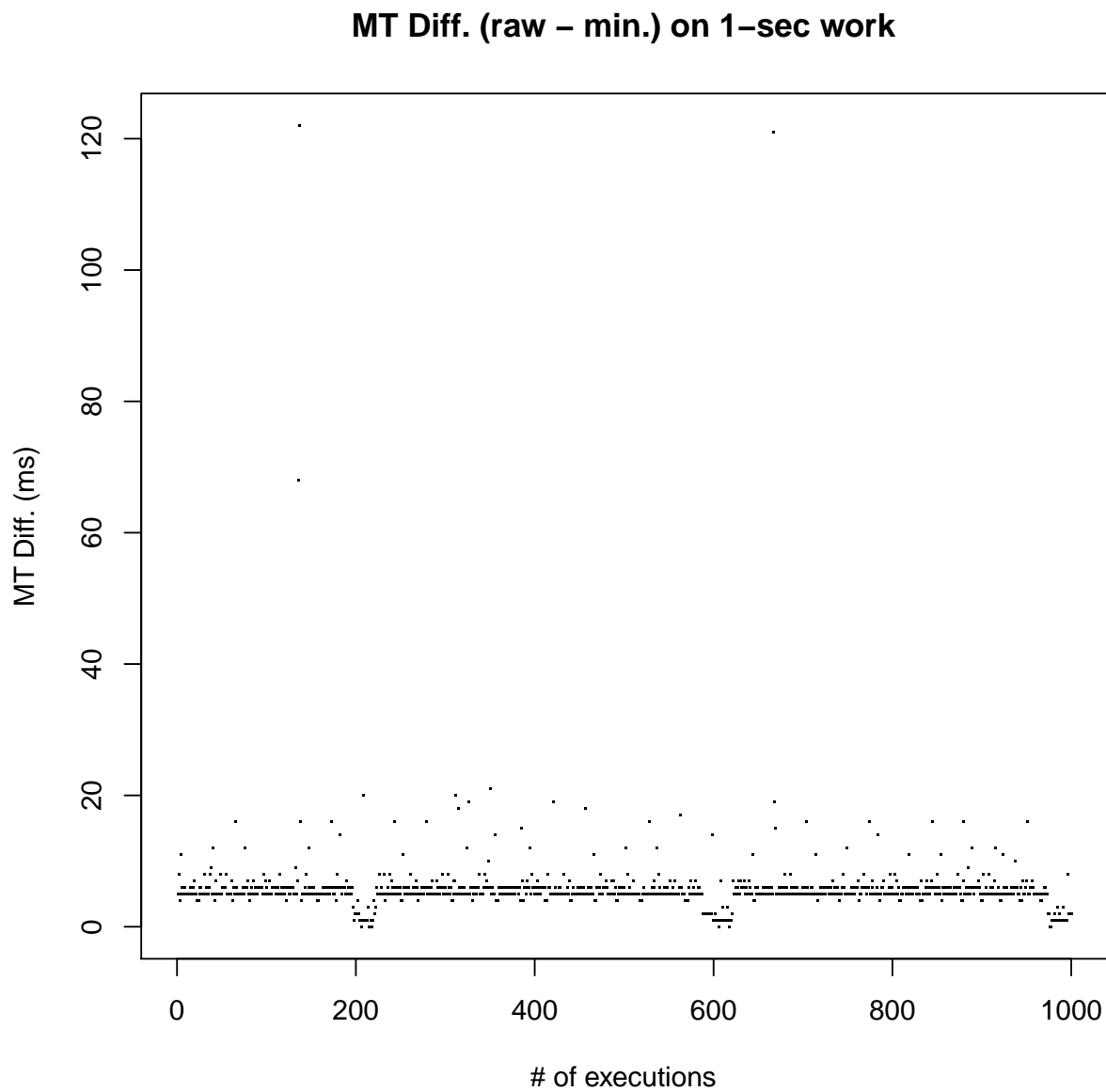
MT Diff. (raw – min.) on 1–sec work

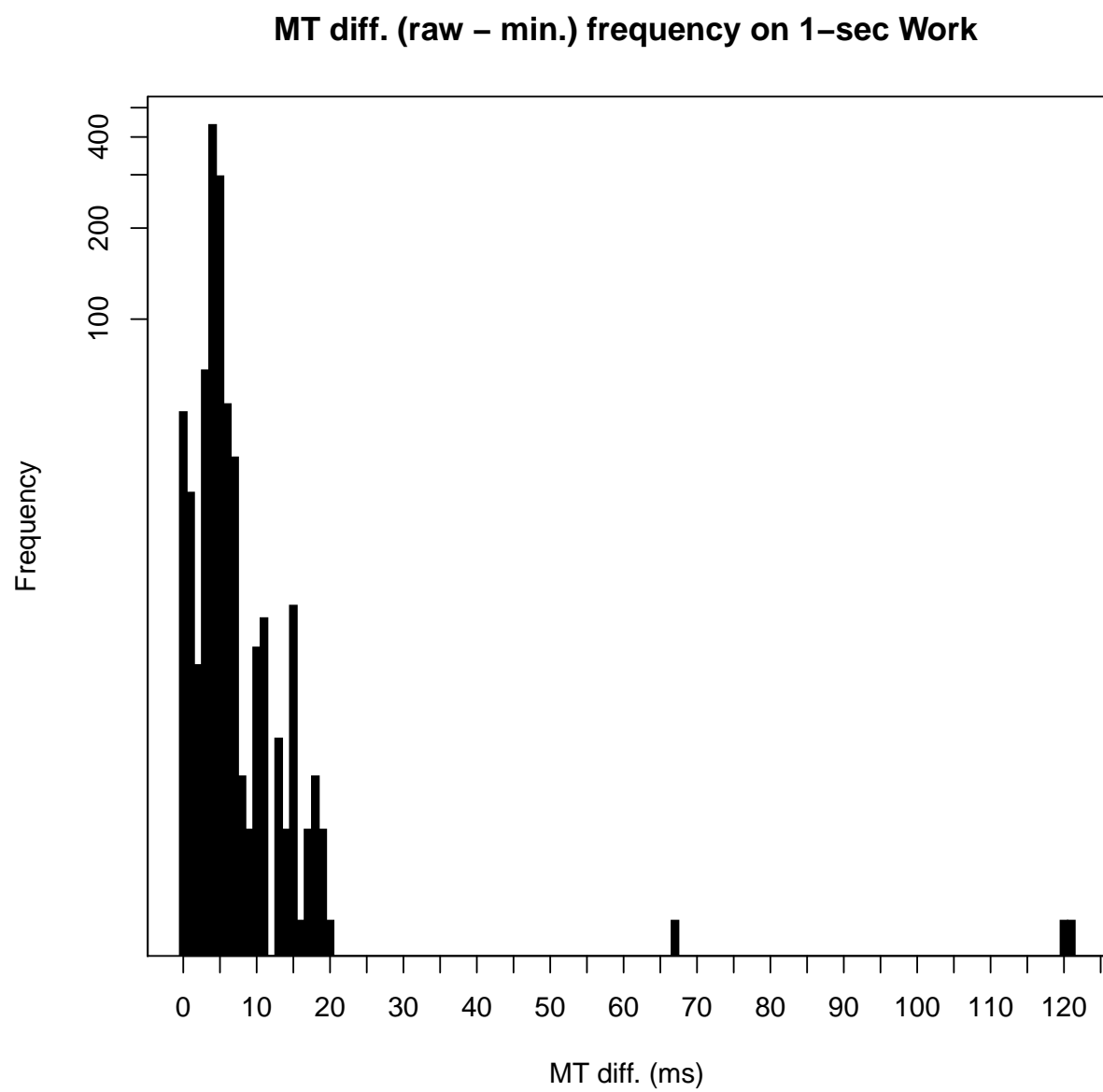Figure 1: Per-execution MT difference (raw - min) on 1-sec work

Figure 2: MT difference histogram by frequency on 1-sec work

2.1.2 Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	1034	1094	1039.0	1039.1	2.39

Table 3: PT statistics on 1-sec work
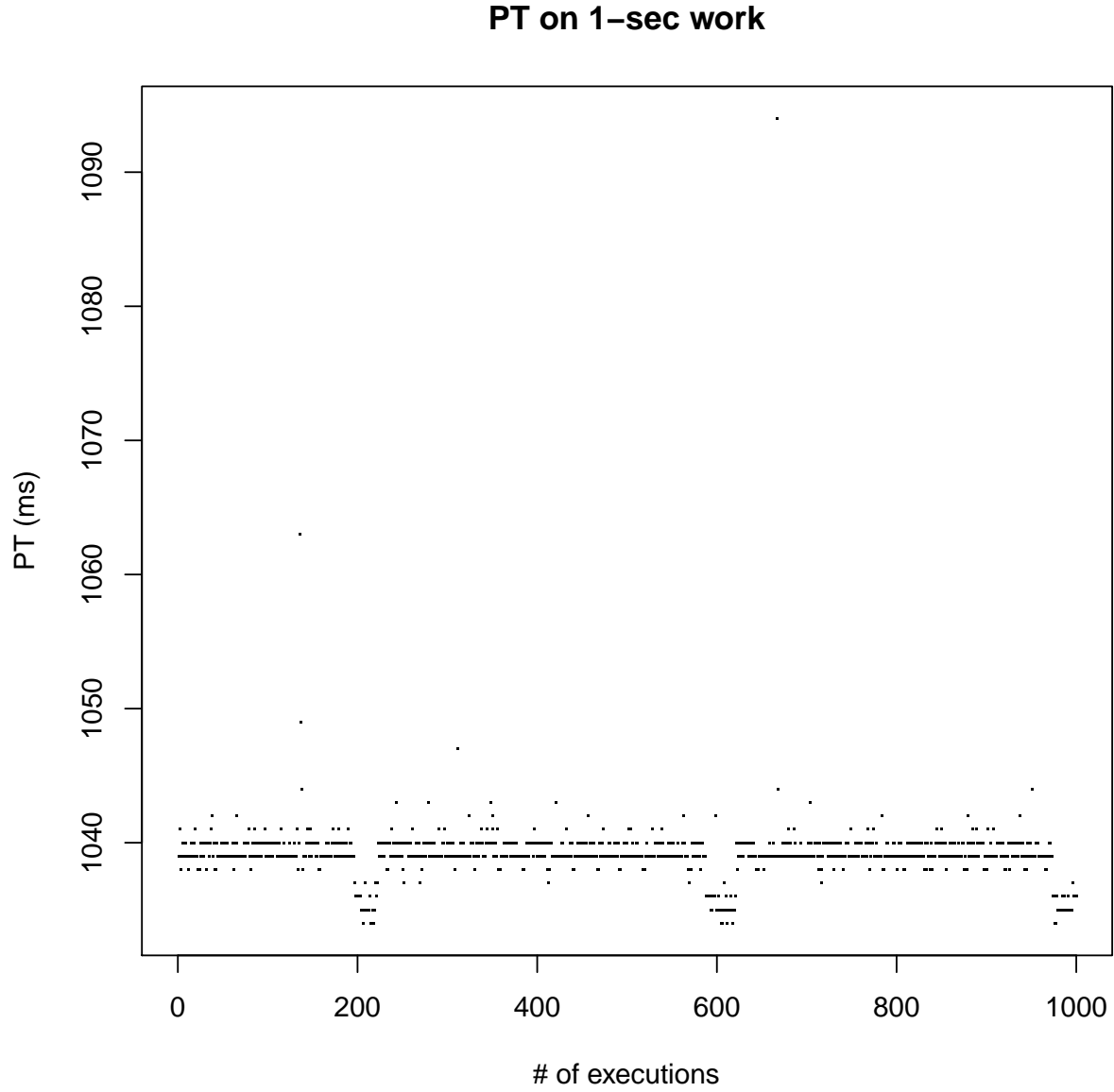
PT on 1–sec work

Figure 3: Per-execution PT on 1-sec work
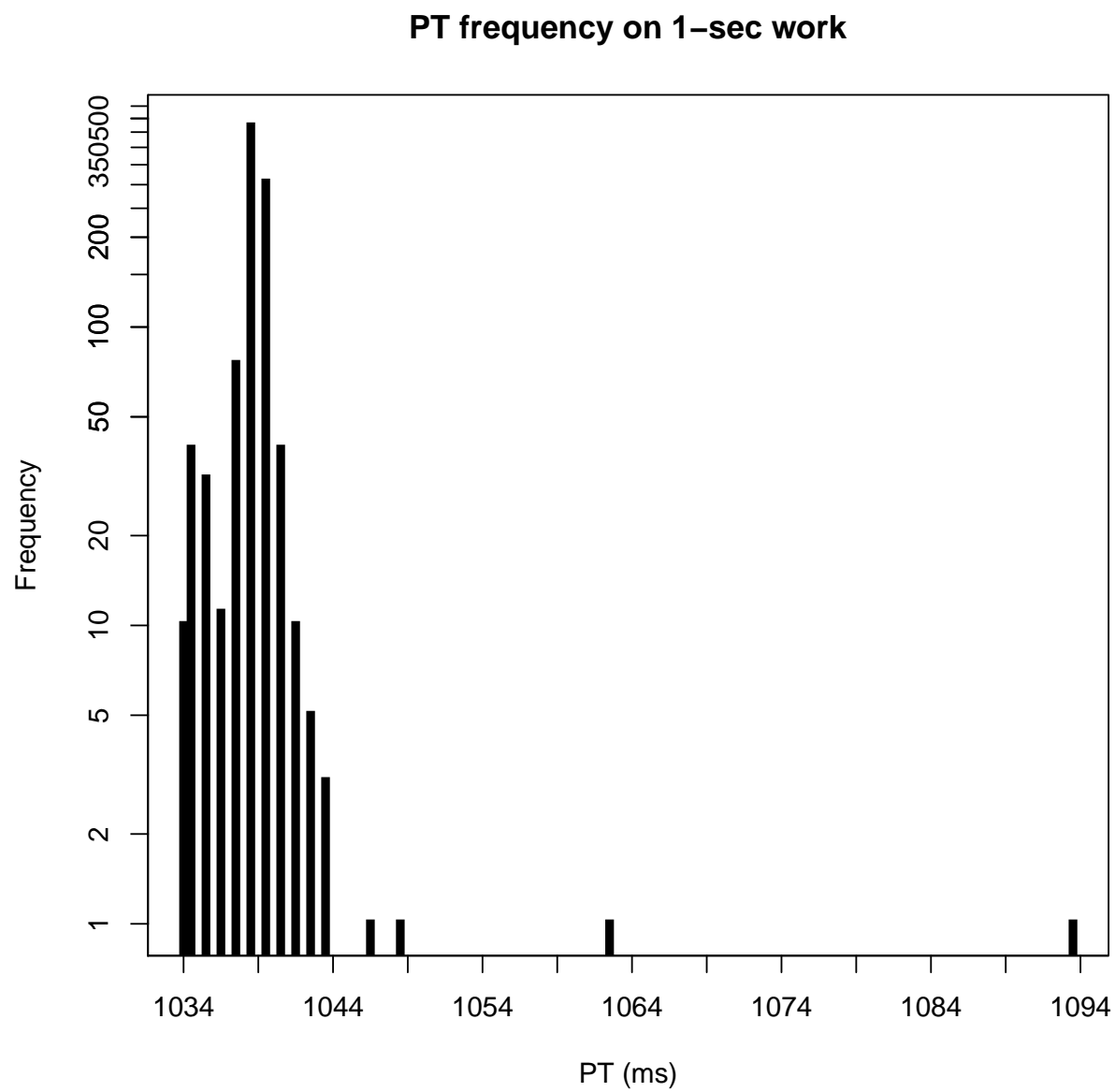
PT frequency on 1−sec work

Figure 4: PT histogram by frequency on 1-sec work

2.1.3   Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	-1	107	0.0	0.7	4.4

Table 4: TD statistics on 1-sec work

TD on 1–sec work
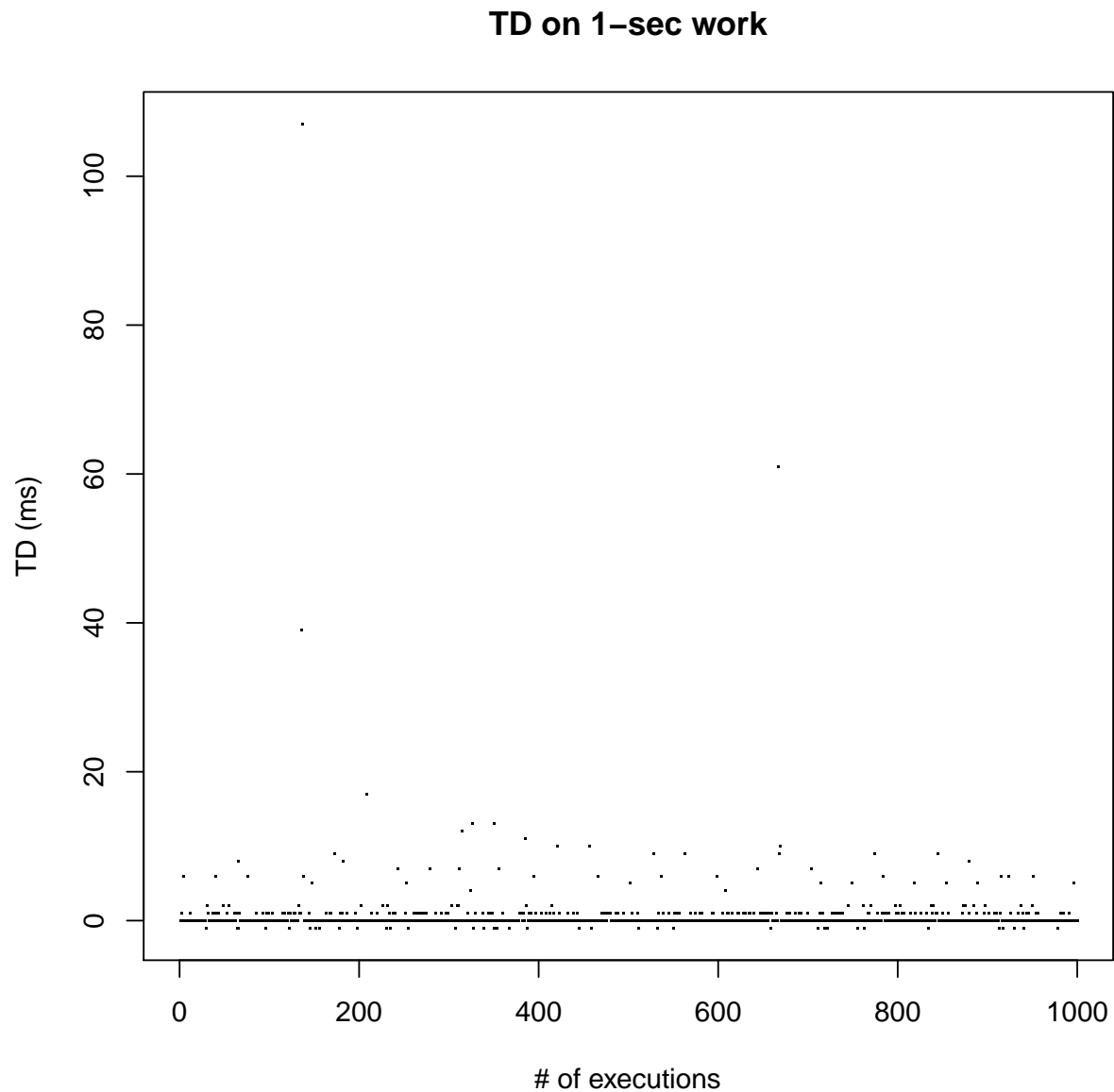

Figure 5: Per-execution TD on 1-sec work

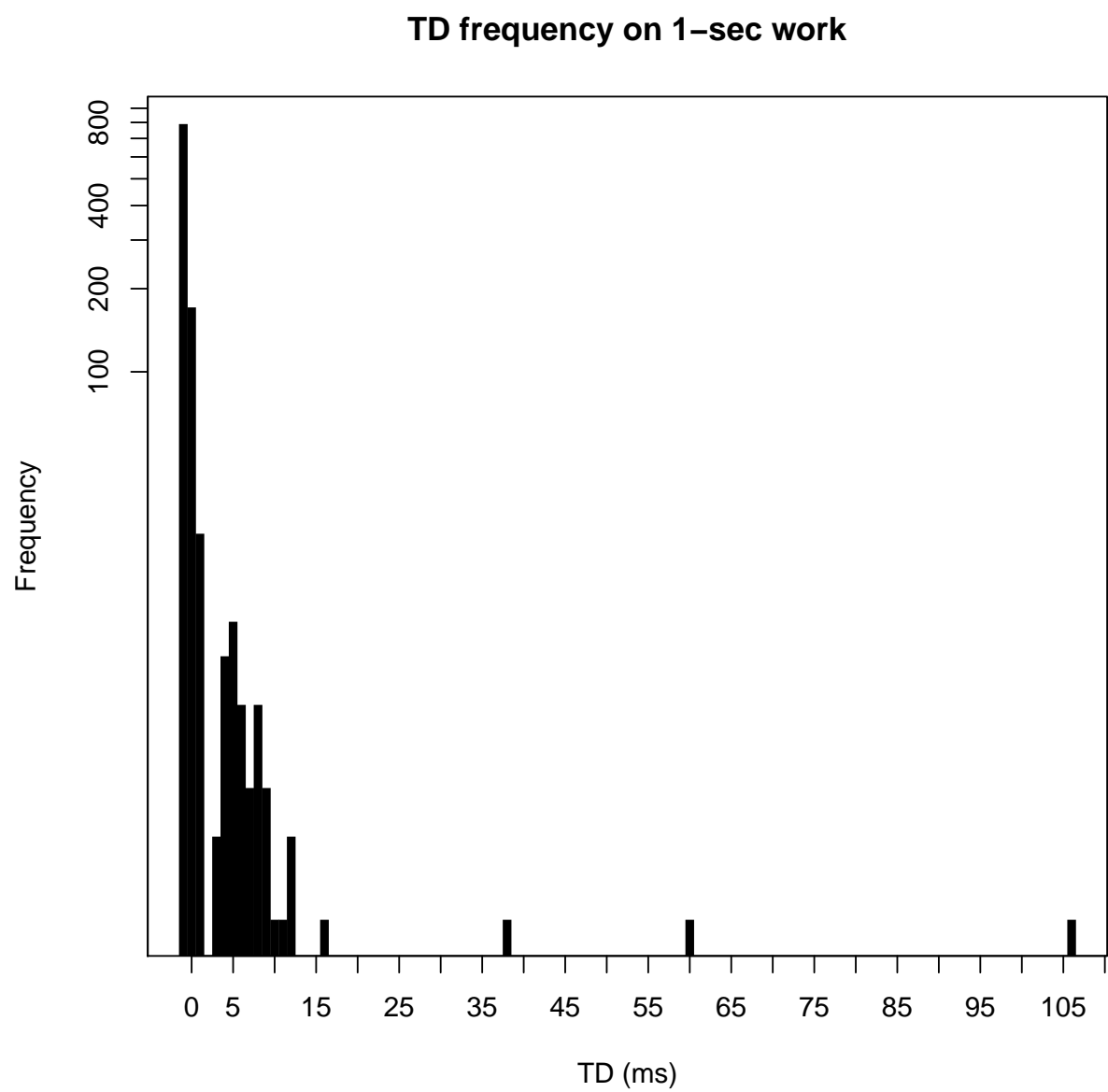**TD frequency on 1−sec work**

Figure 6: TD histogram by frequency on 1-sec work

2.2   2 Second

2.2.1   Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	2069	2327	2078.0	2080.0	15.66

Table 5: Measured time statistics on 2-sec work

MT Diff. (raw – min.) on 2–sec work
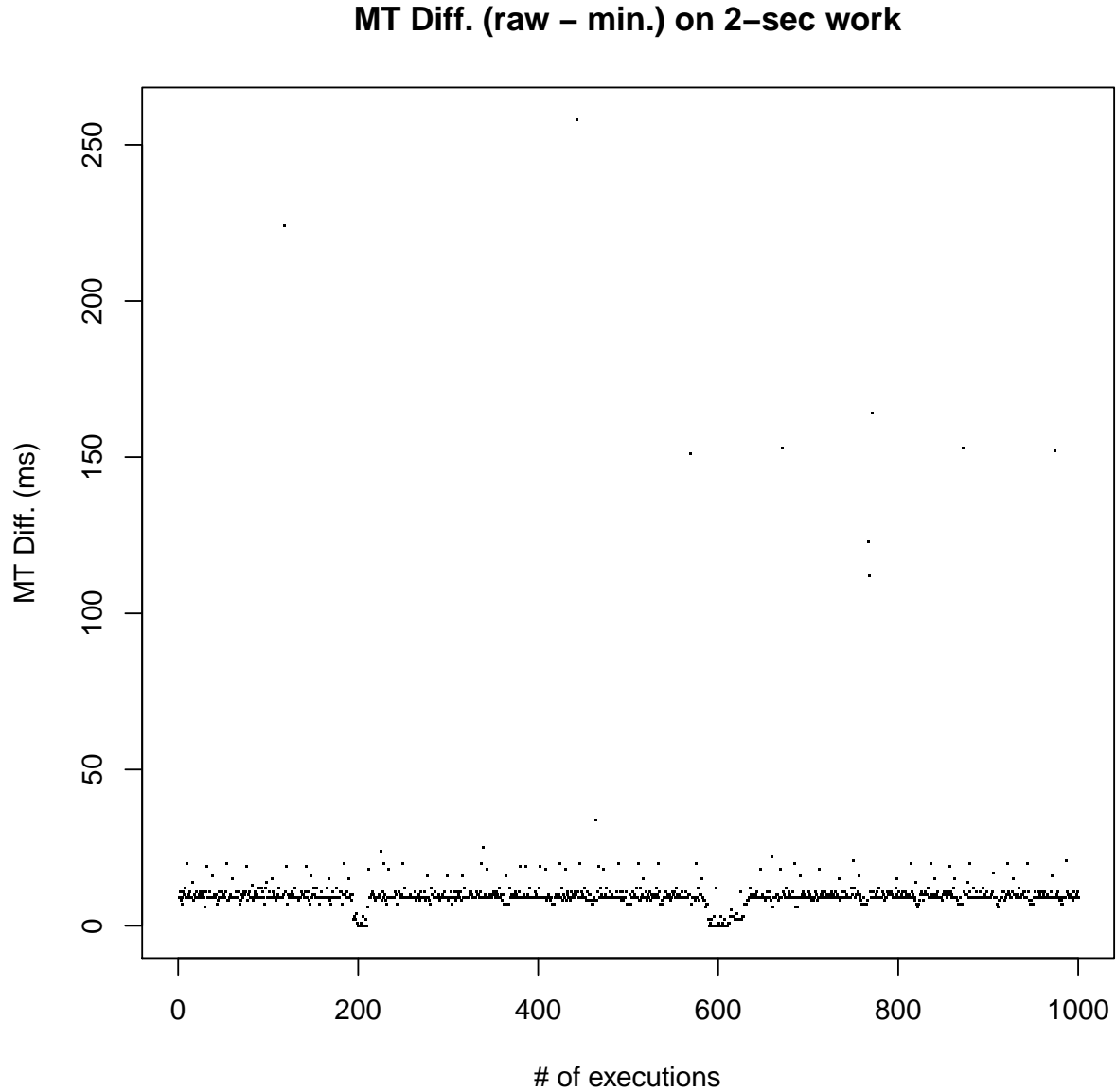
Figure 7: Per-execution MT difference (raw - min) on 2-sec work

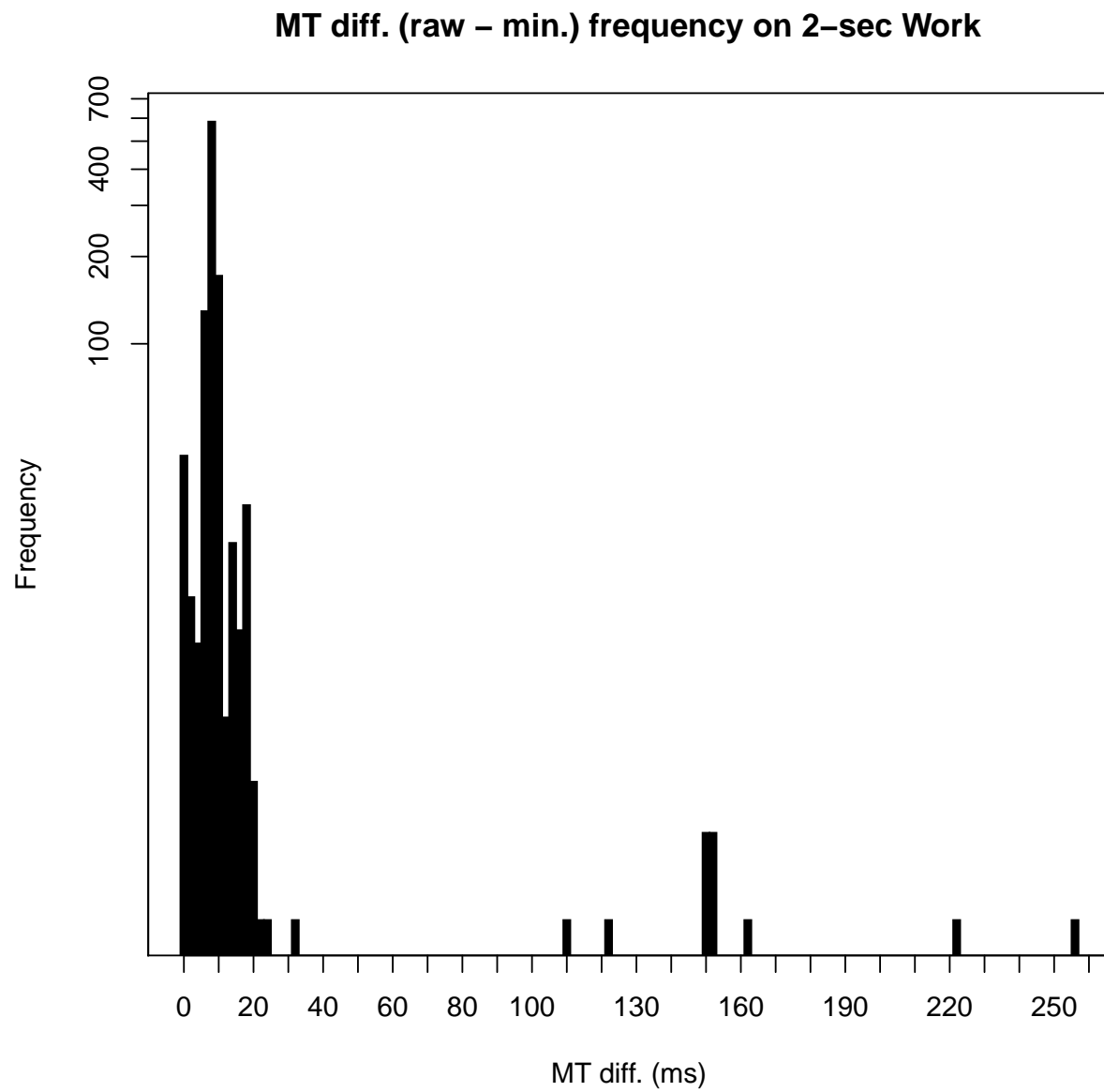# MT diff. (raw – min.) frequency on 2–sec Work

Figure 8: MT difference histogram by frequency on 2-sec work

2.2.2 Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	2068	2157	2078.0	2078.0	4.33

Table 6: PT statistics on 2-sec work
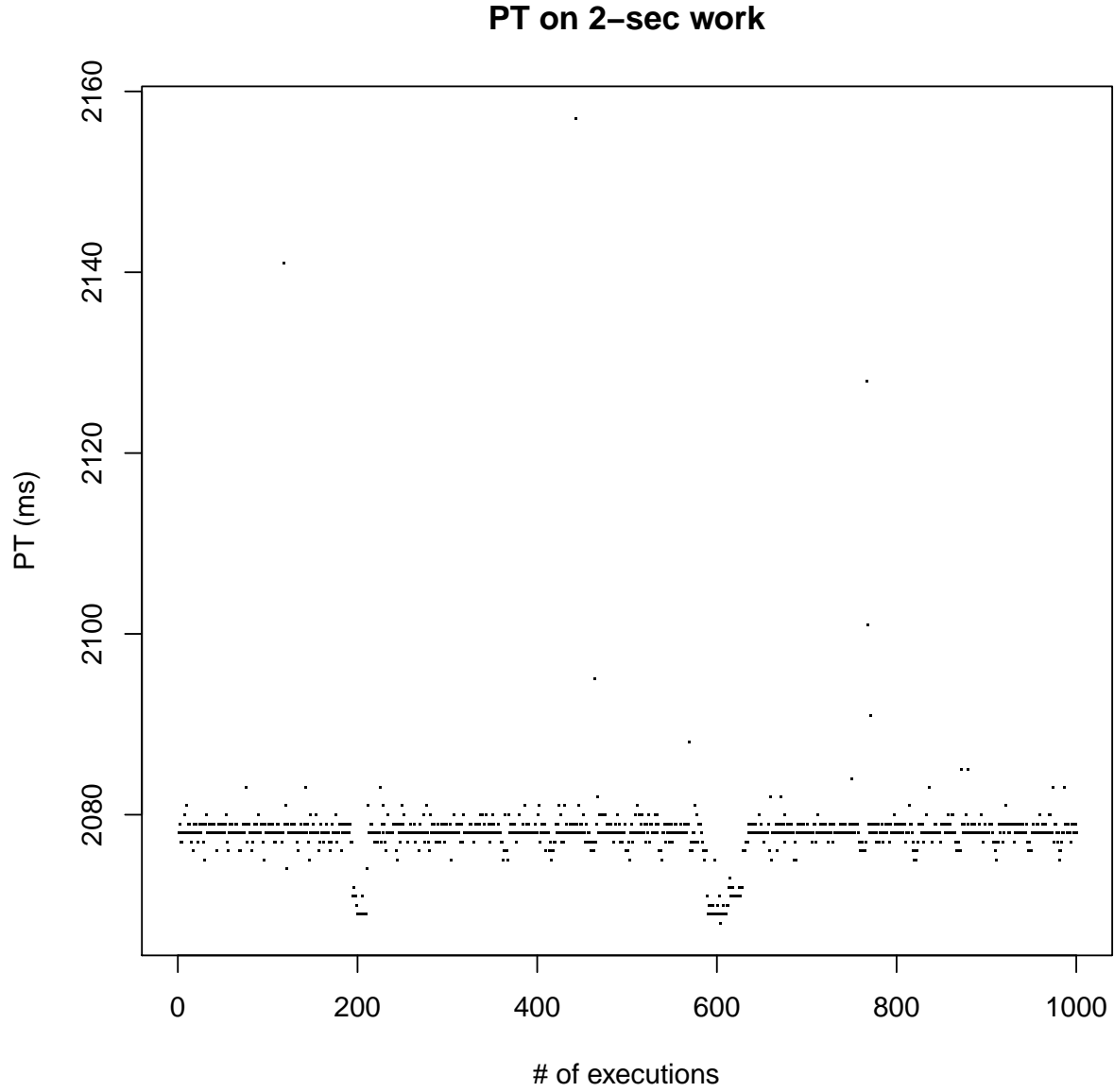
PT on 2–sec work
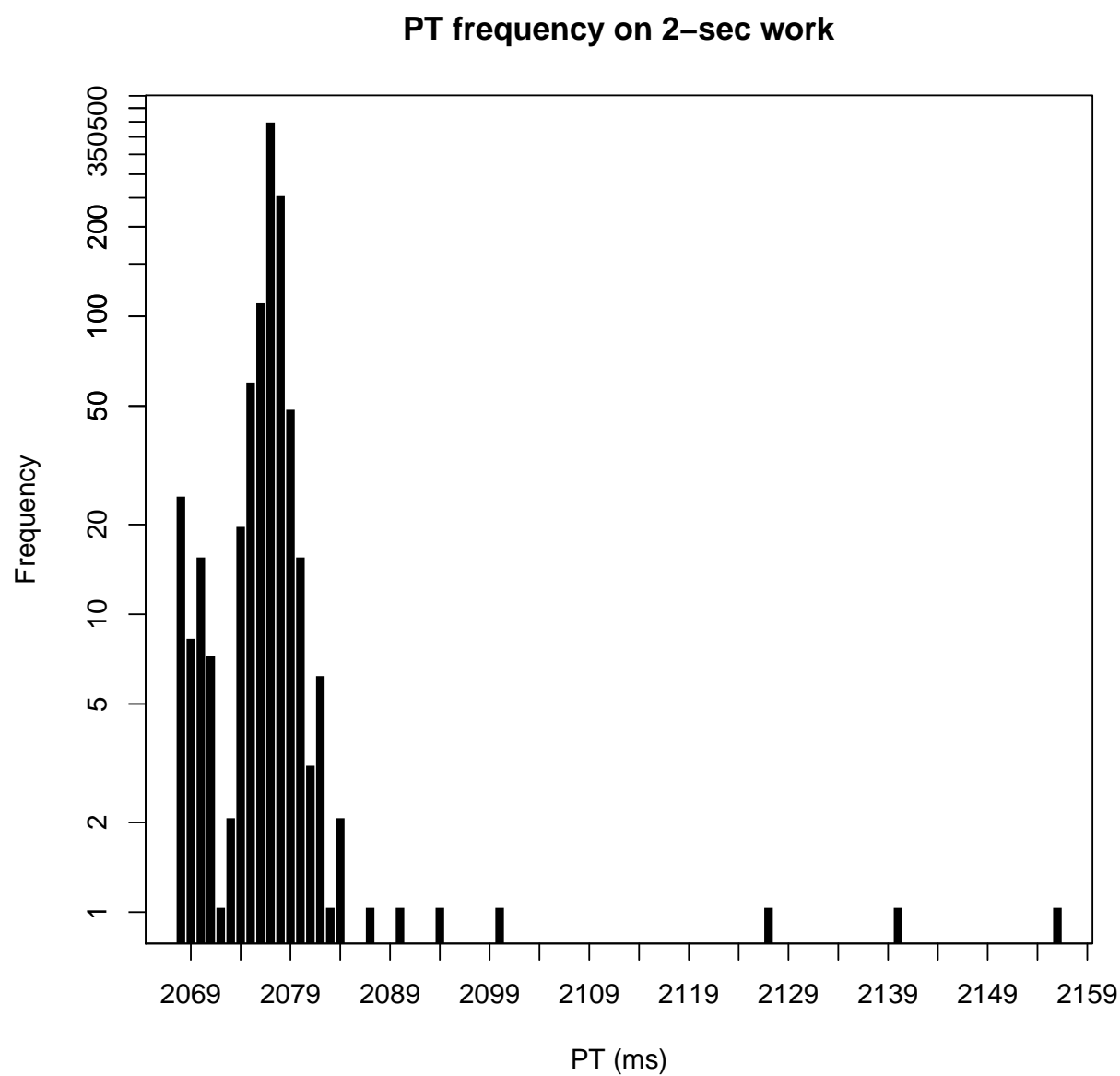

Figure 9: Per-execution PT on 2-sec work

Figure 10: PT histogram by frequency on 2-sec work

2.2.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	-1	170	0.0	2.0	12.56

<div align="center">Table 7: TD statistics on 2-sec work</div>
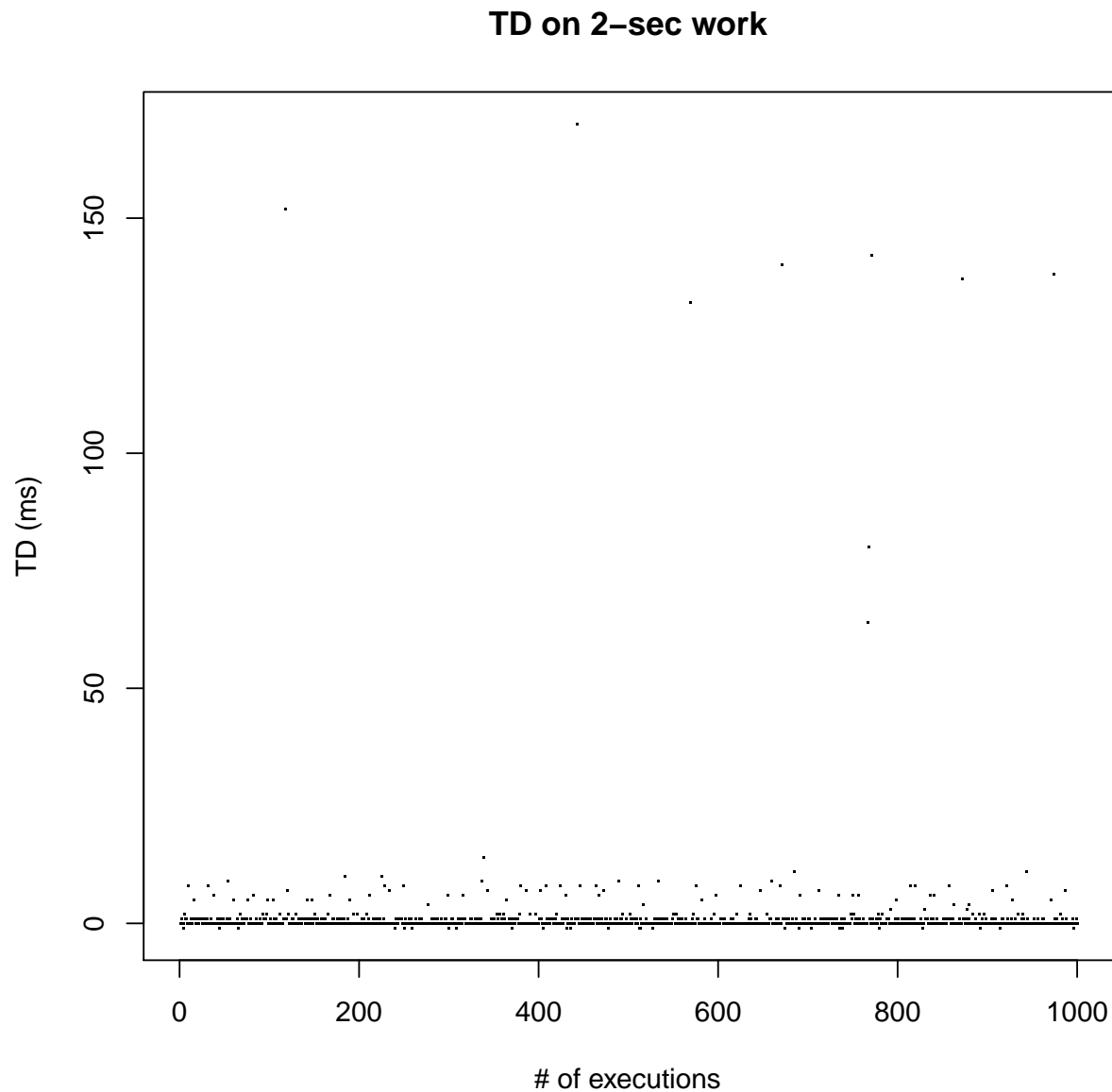
TD on 2–sec work

<div align="center">Figure 11: Per-execution TD on 2-sec work</div>
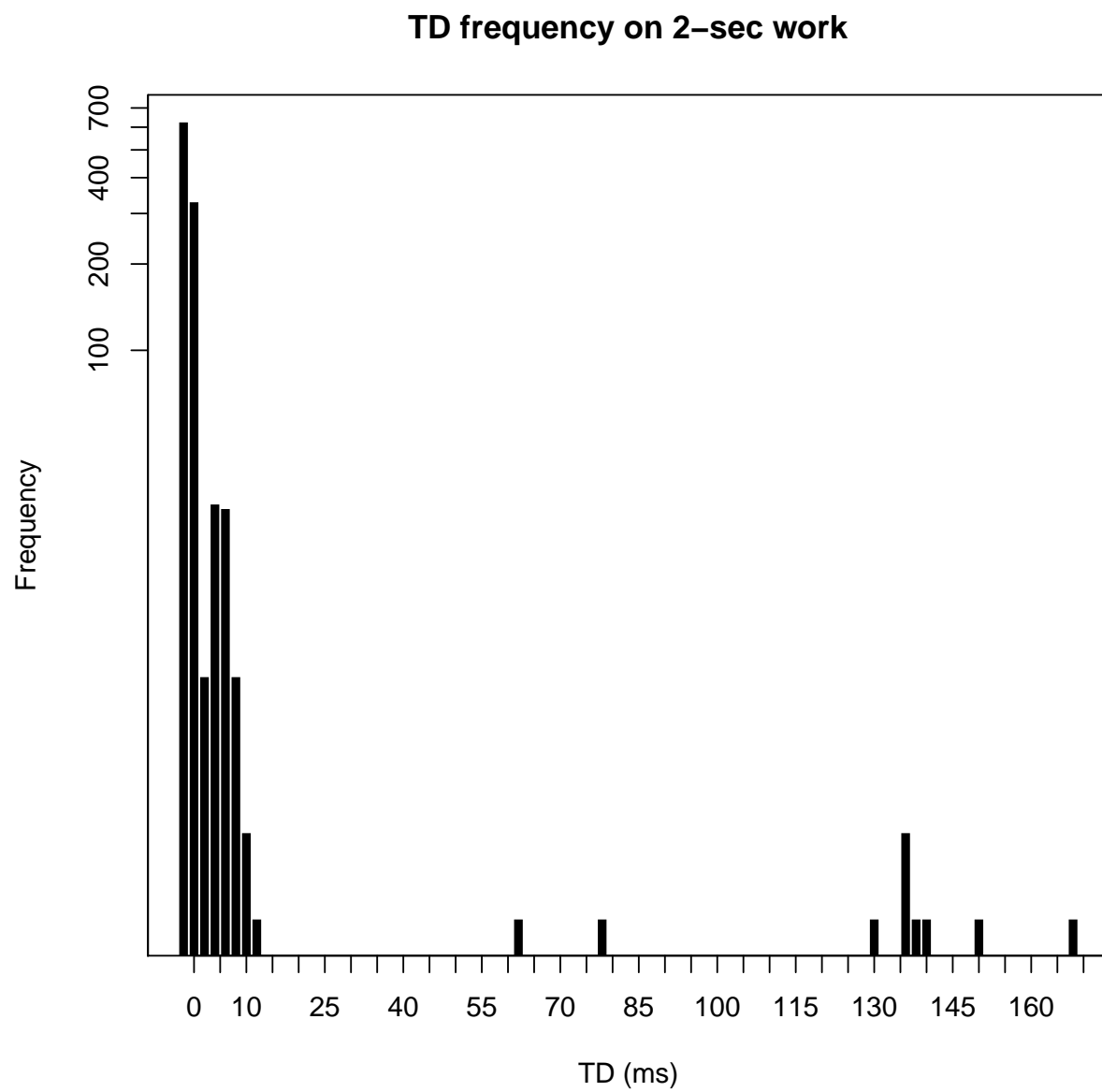
TD frequency on 2−sec work

Figure 12: TD histogram by frequency on 2-sec work

2.3 4 Second

2.3.1 Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	4137	4413	4156.0	4160.4	27.16

Table 8: Measured time statistics on 4-sec work
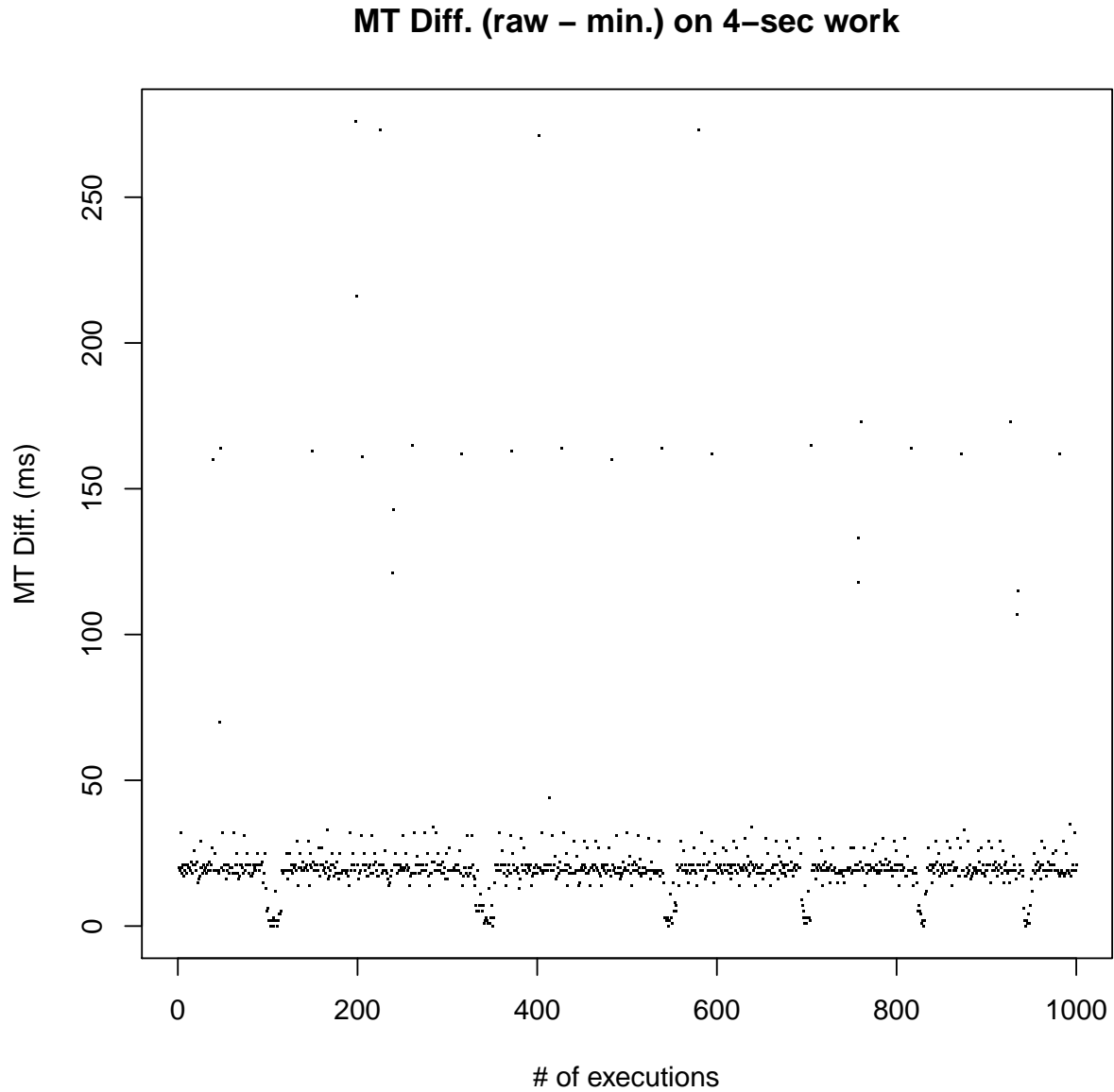
MT Diff. (raw – min.) on 4–sec work

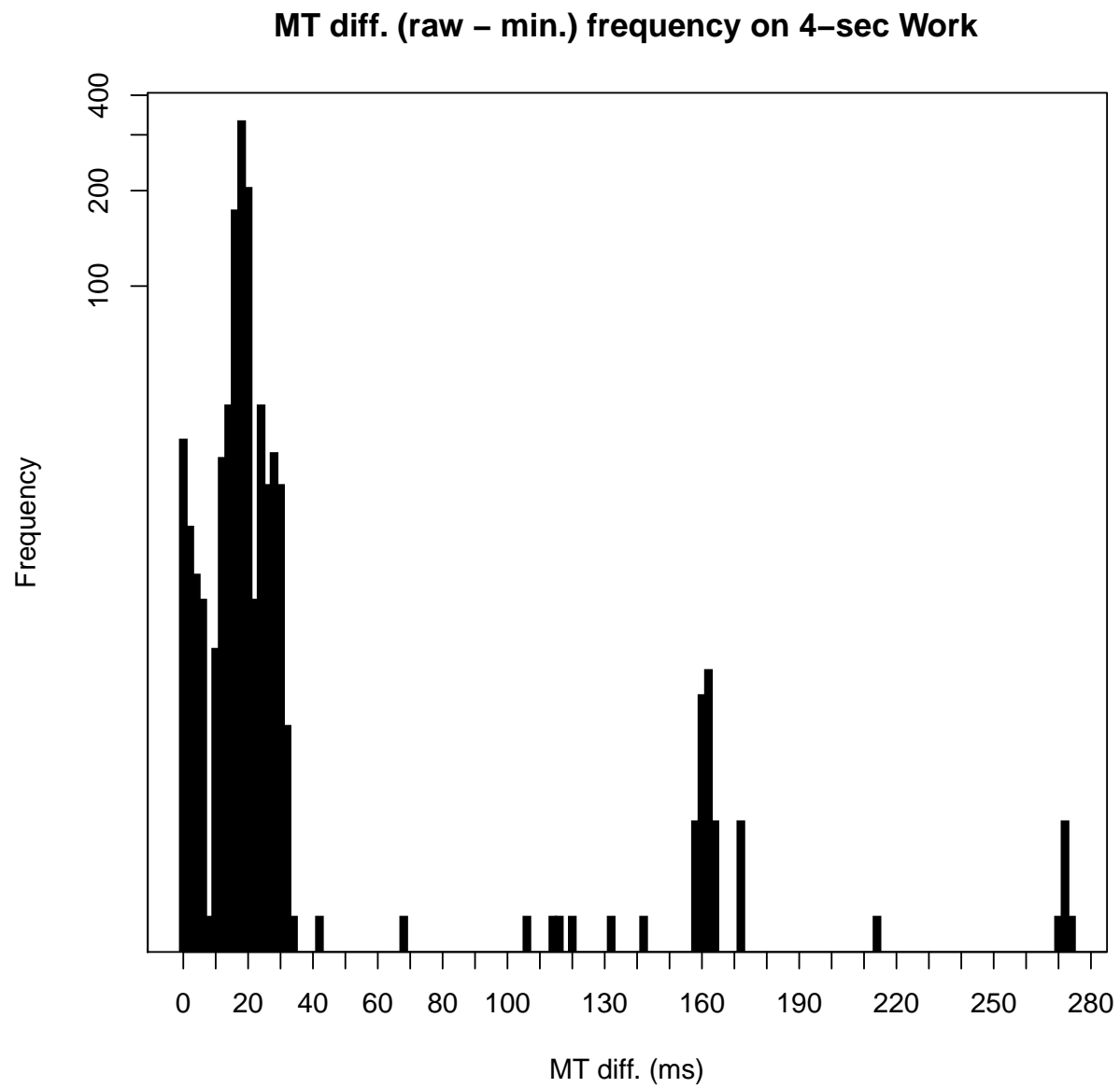Figure 13: Per-execution MT difference (raw - min) on 4-sec work

Figure 14: MT difference histogram by frequency on 4-sec work

2.3.2   Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	4136	4242	4156.0	4155.1	7.52

Table 9: PT statistics on 4-sec work

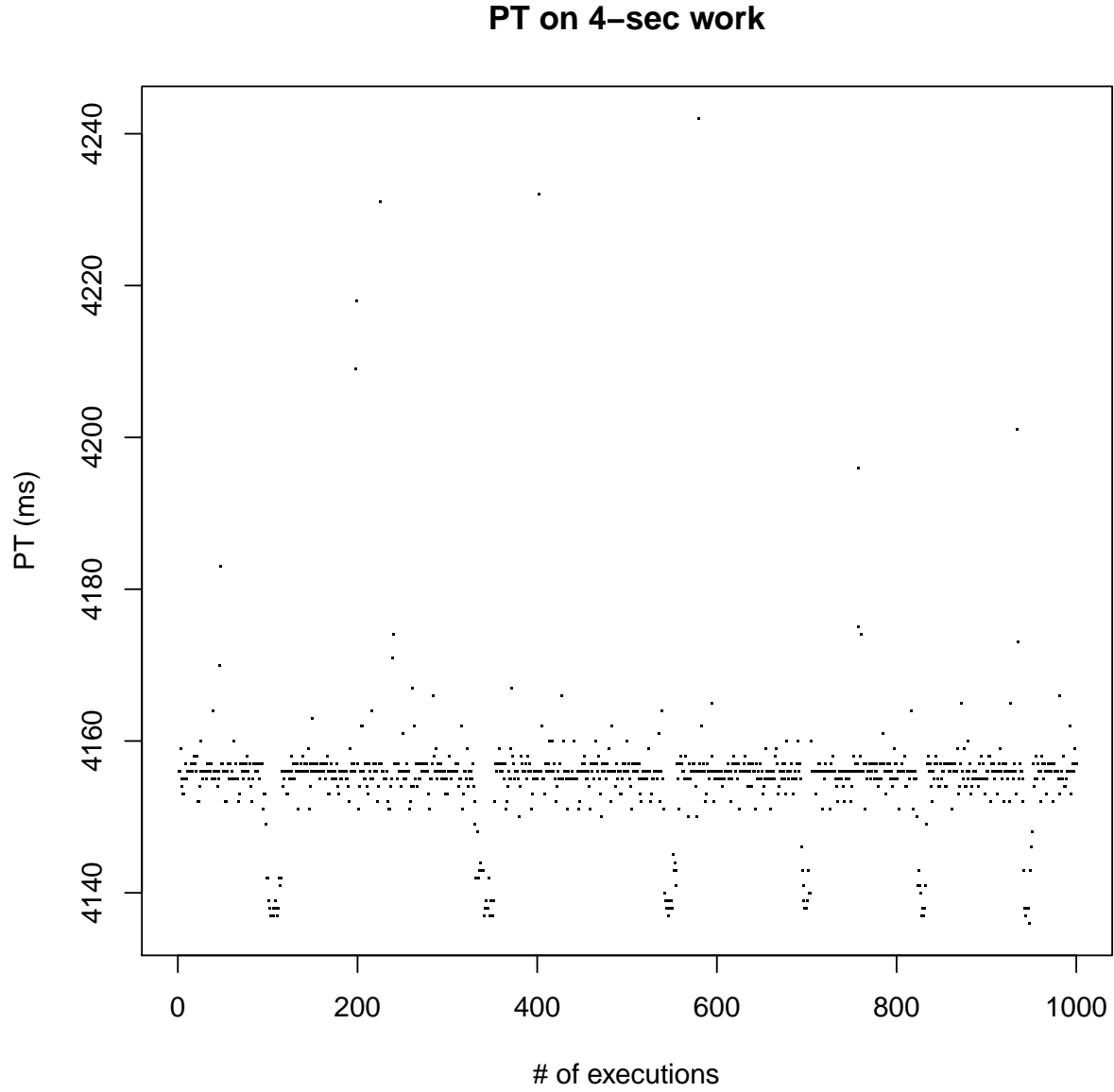**PT on 4–sec work**

Figure 15: Per-execution PT on 4-sec work
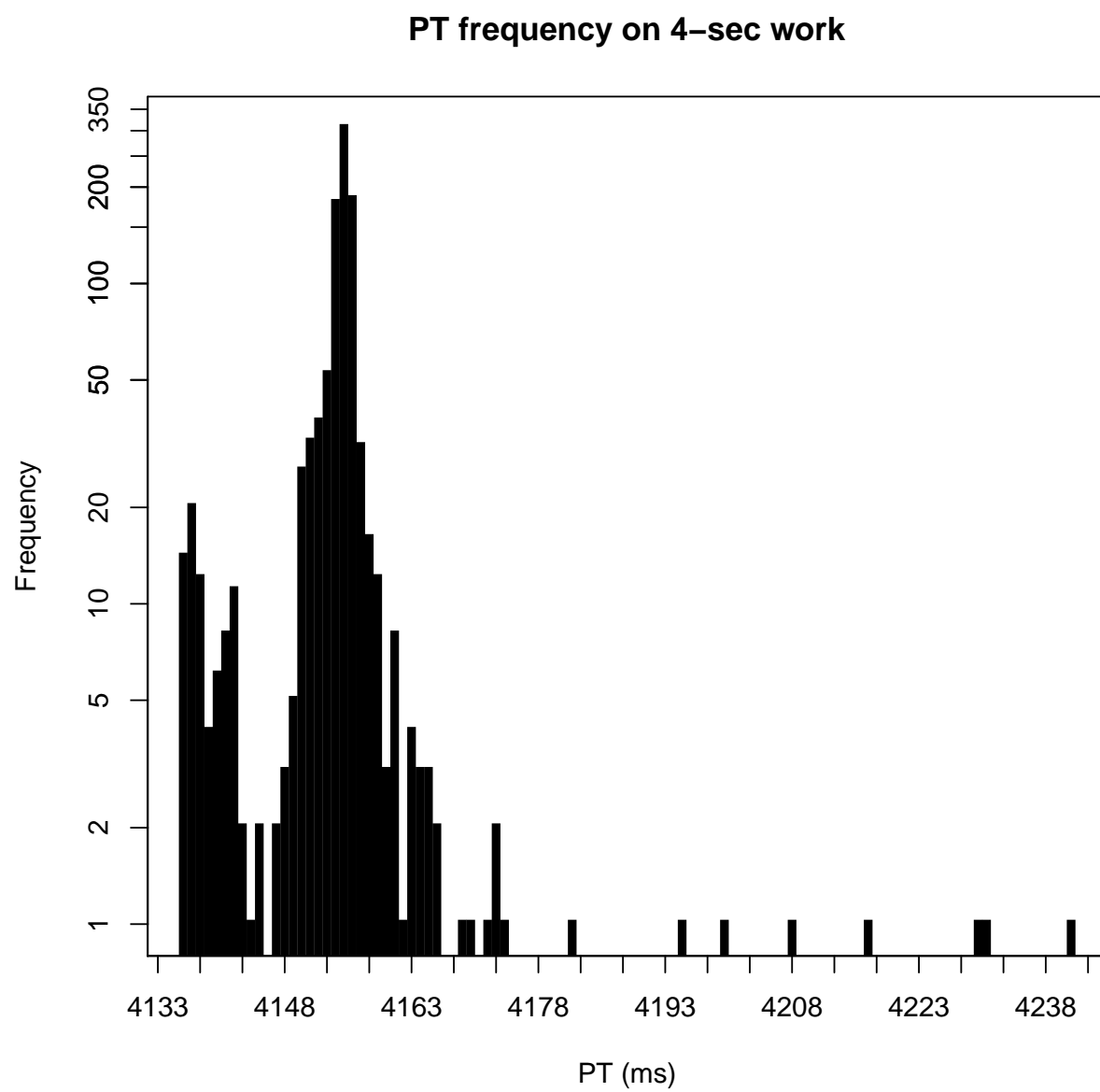
PT frequency on 4–sec work

Figure 16: PT histogram by frequency on 4-sec work

2.3.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	-1	204	1.0	5.3	22.03

<div align="center">Table 10: TD statistics on 4-sec work</div>
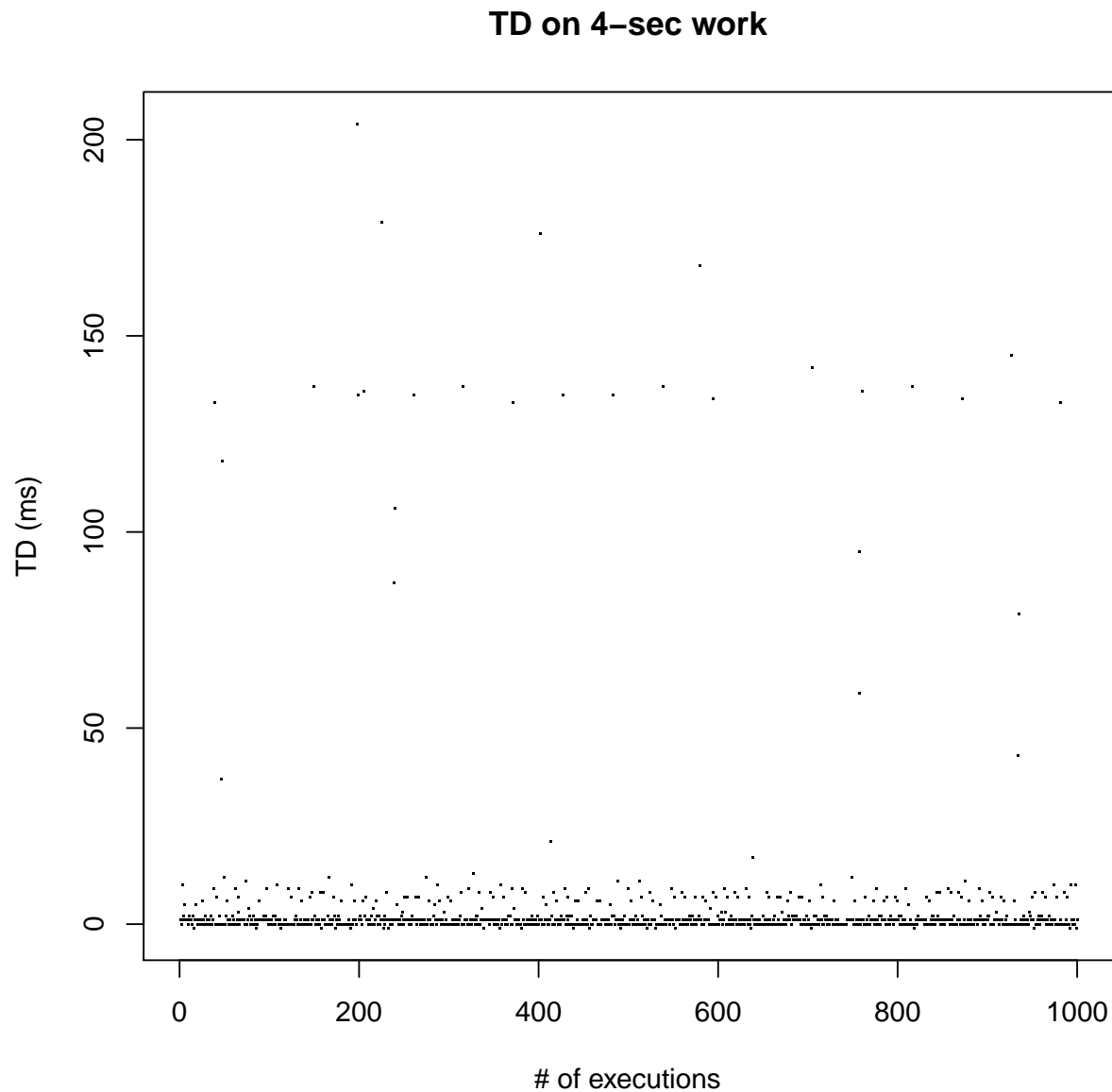

Figure 17: Per-execution TD on 4-sec work

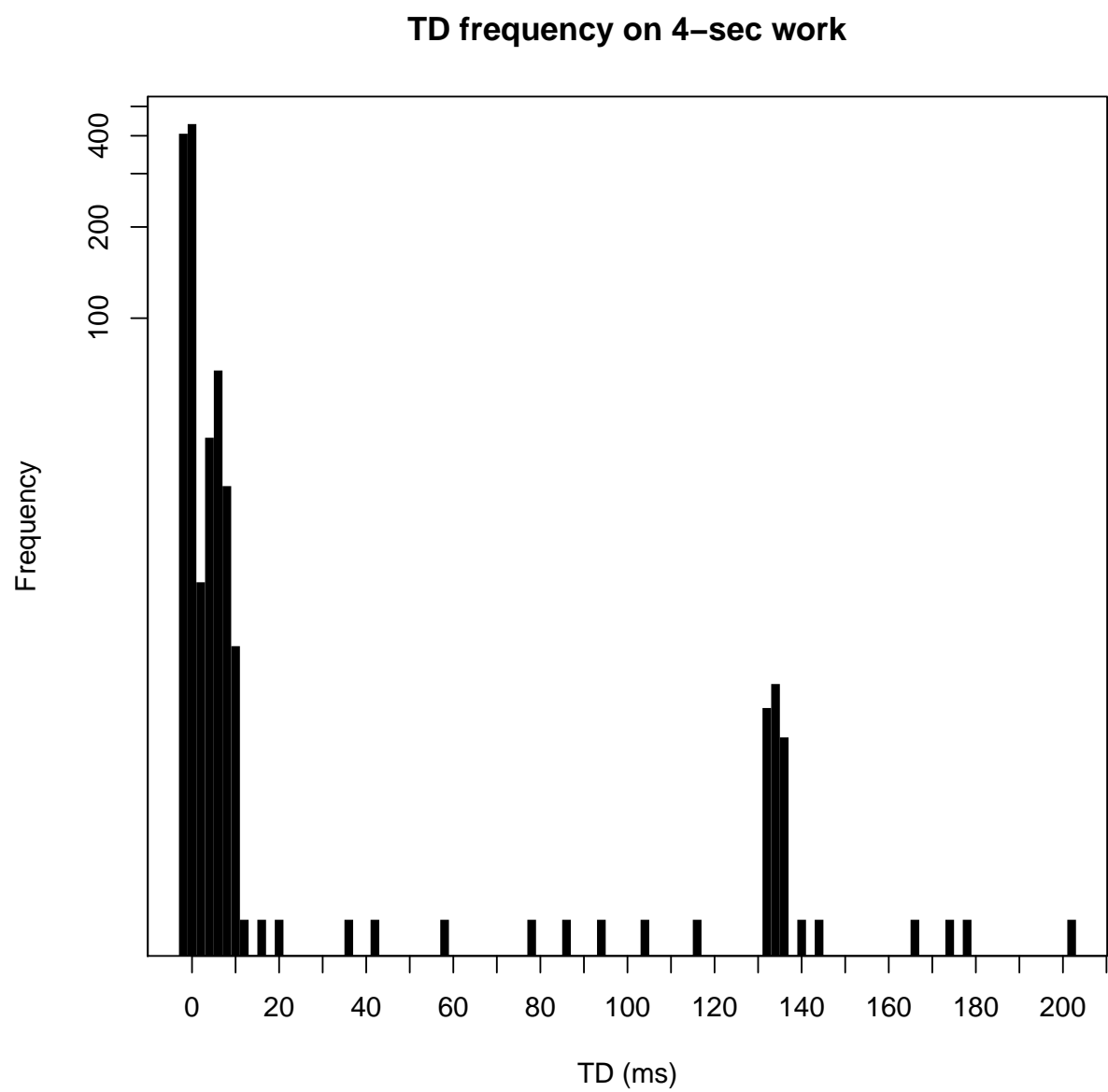**TD frequency on 4−sec work**

Figure 18: TD histogram by frequency on 4-sec work

2.4 8 Second

2.4.1 Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	8275	8579	8312.0	8318.1	33.82

Table 11: Measured time statistics on 8-sec work
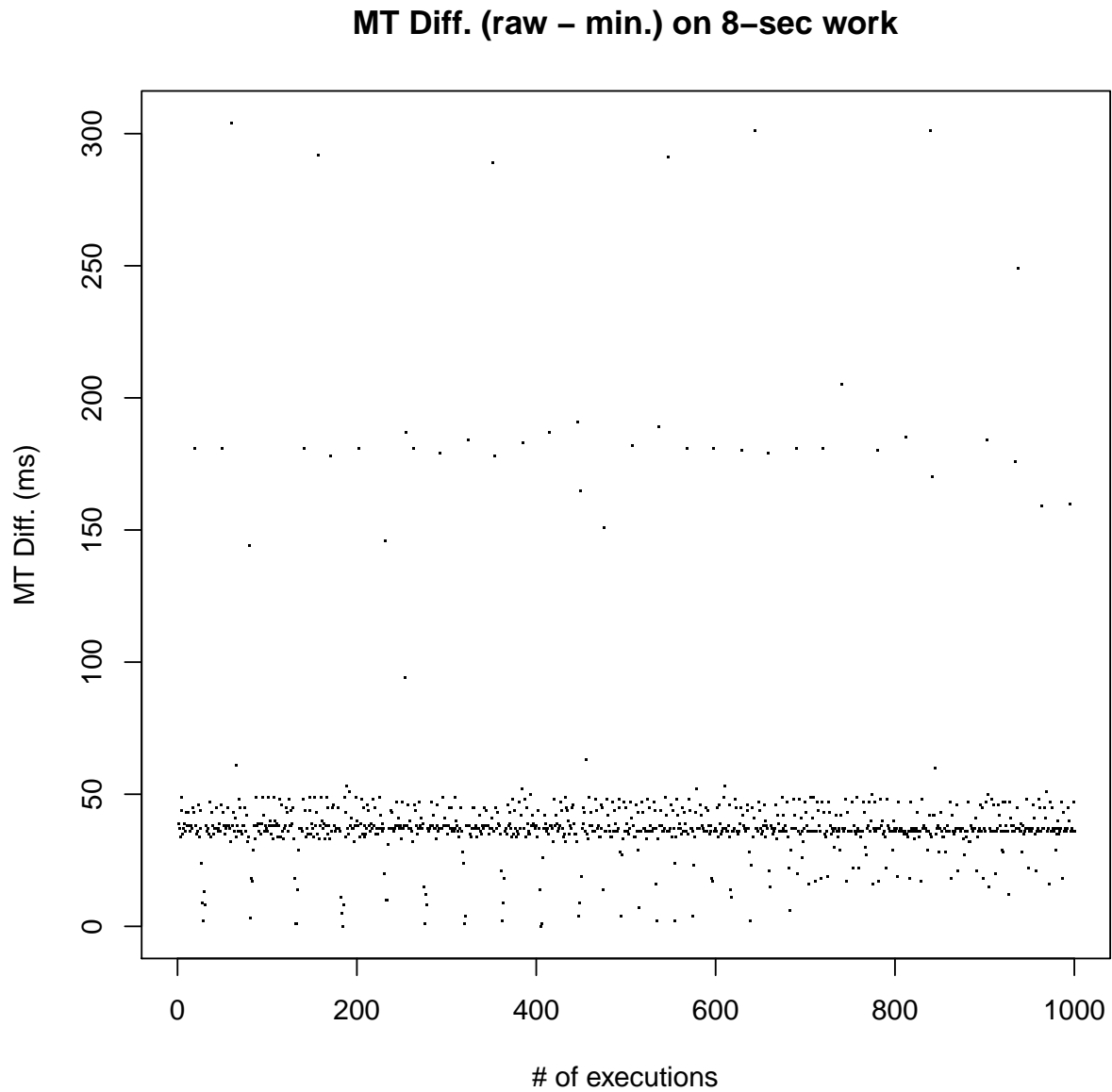
Figure 19: Per-execution MT difference (raw - min) on 8-sec work
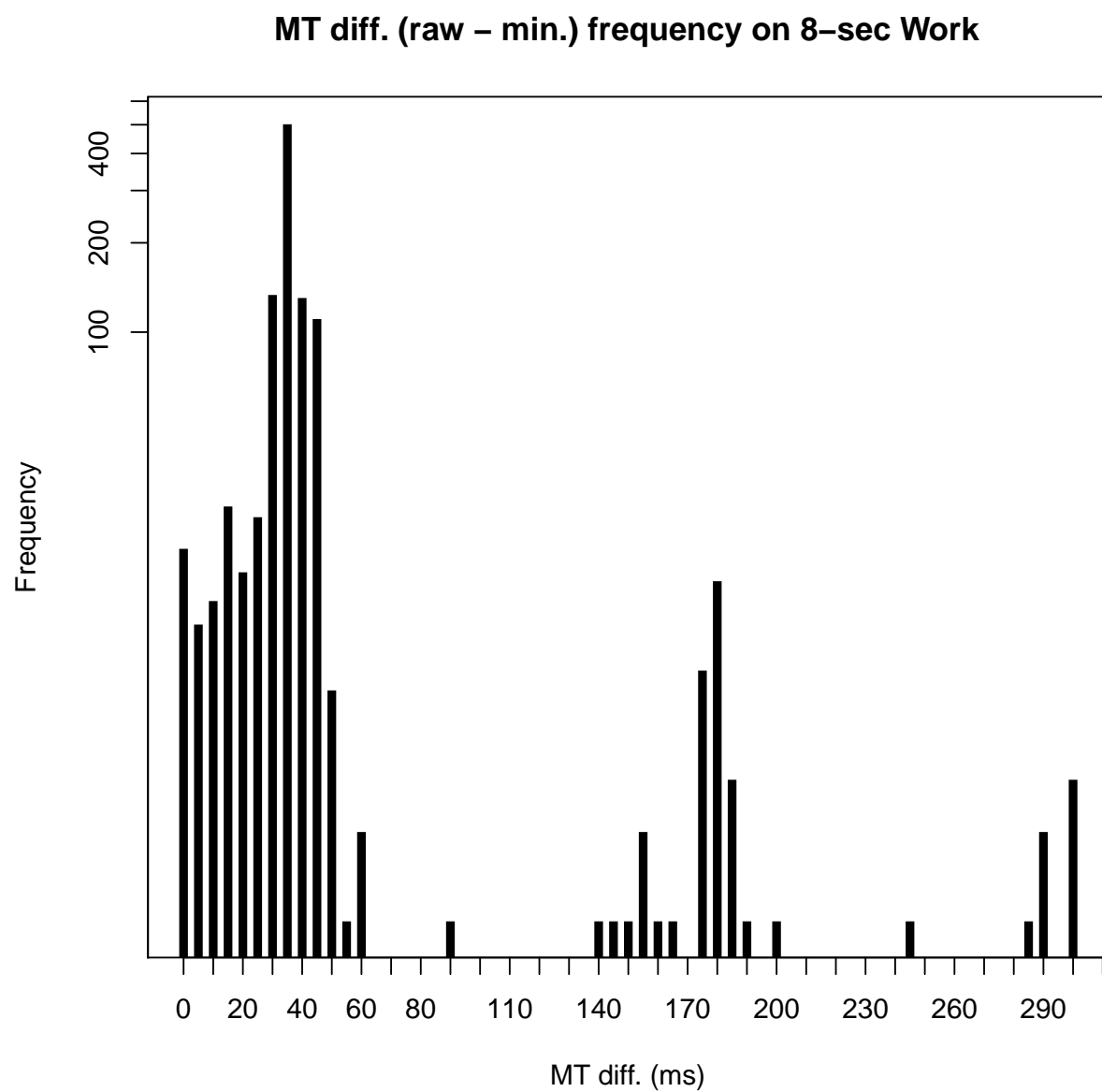
MT diff. (raw – min.) frequency on 8–sec Work

Figure 20: MT difference histogram by frequency on 8-sec work

2.4.2 Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	8275	8396	8310.0	8309.2	10.66

Table 12: PT statistics on 8-sec work

PT on 8–sec work

Figure 21: Per-execution PT on 8-sec work

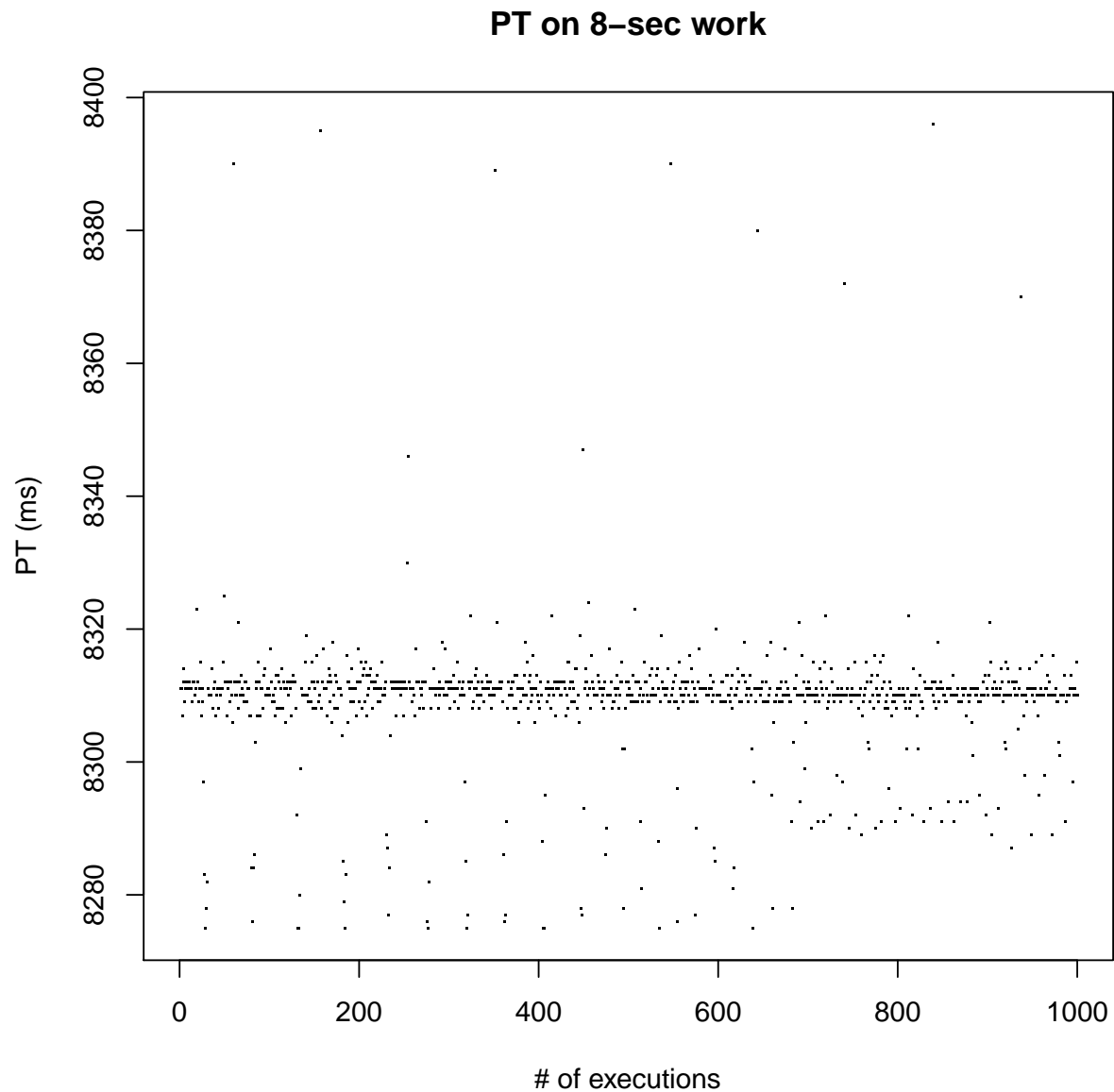**PT frequency on 8–sec work**
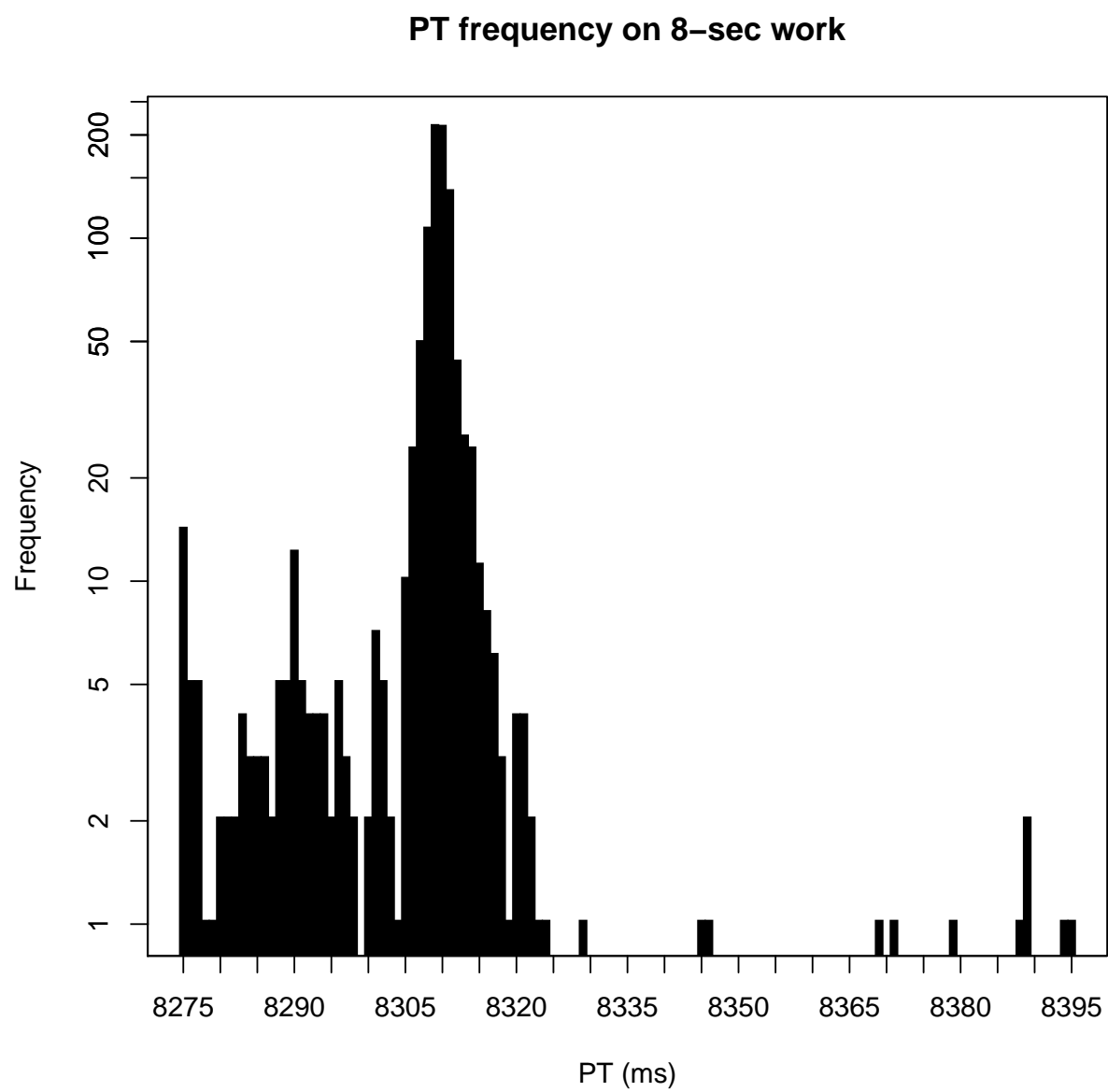

Figure 22: PT histogram by frequency on 8-sec work

2.4.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	-1	196	2.0	8.9	27.68

Table 13: TD statistics on 8-sec work

TD on 8–sec work

Figure 23: Per-execution TD on 8-sec work

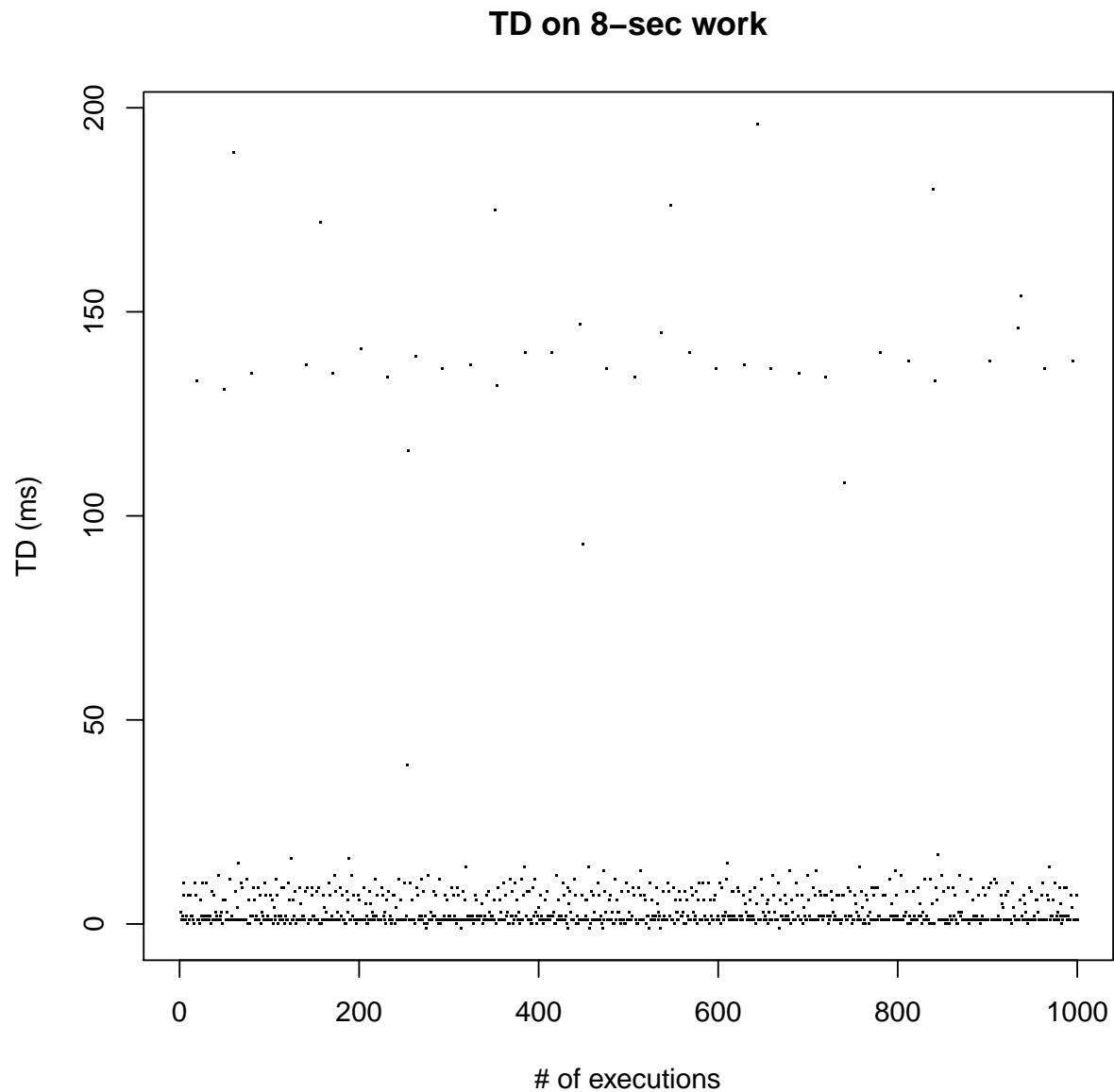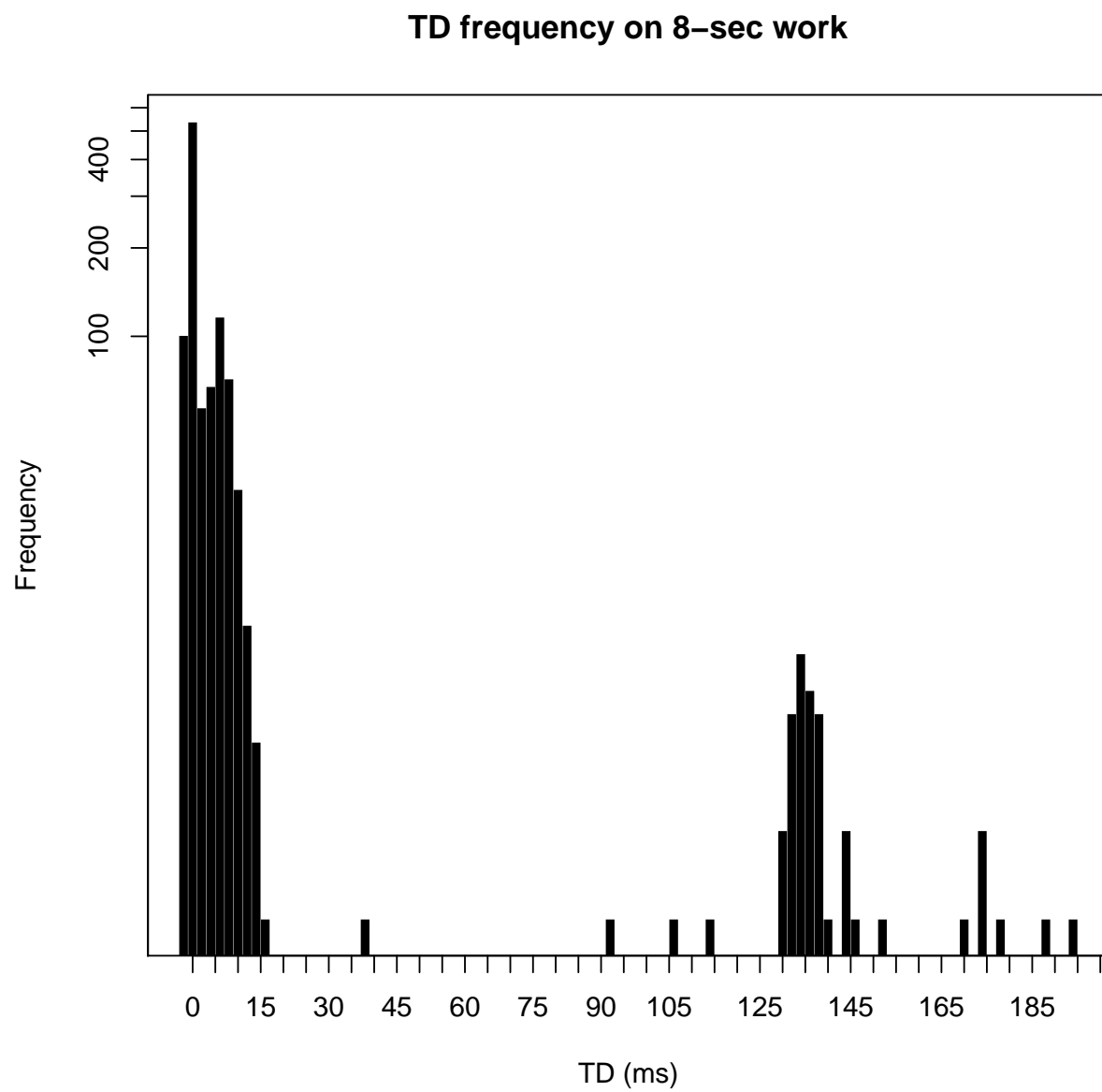**TD frequency on 8–sec work**

Figure 24: TD histogram by frequency on 8-sec work

2.5   16 Second

2.5.1   Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	16549	17236	16624.0	16628.2	49.39

Table 14: Measured time statistics on 16-sec work
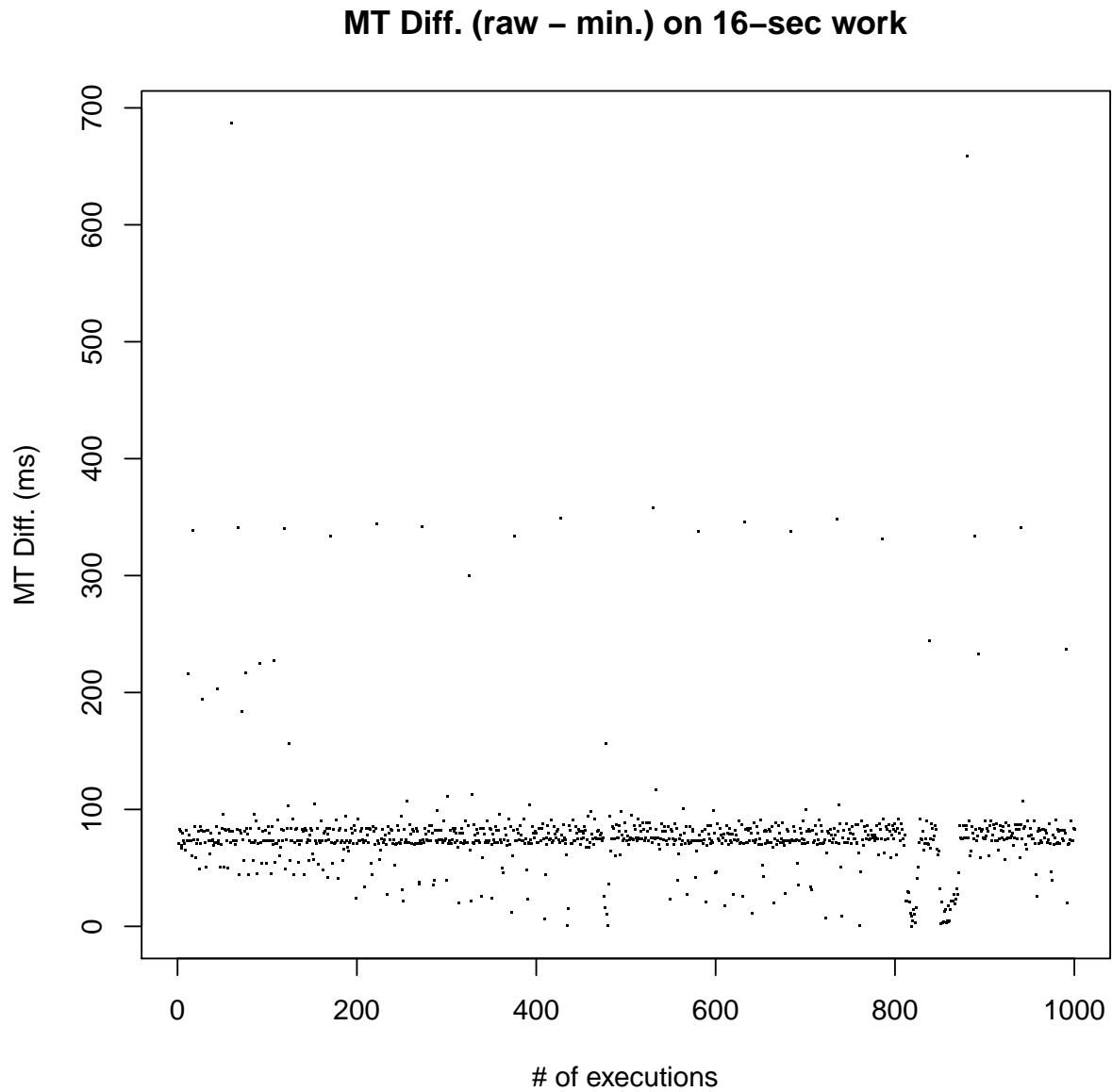
MT Diff. (raw – min.) on 16–sec work

Figure 25: Per-execution MT difference (raw - min) on 16-sec work
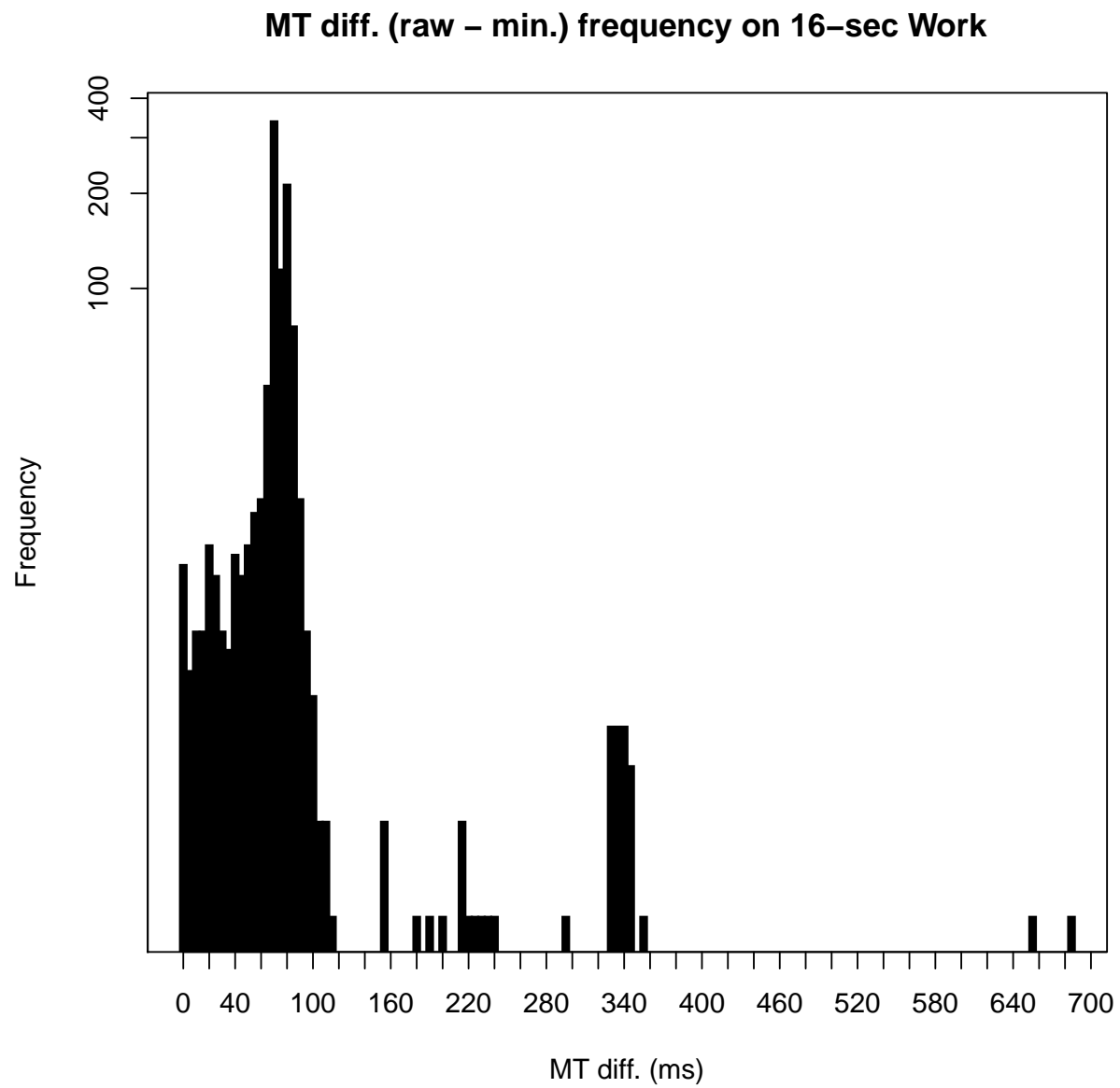
Figure 26: MT difference histogram by frequency on 16-sec work

2.5.2 Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	16548	16743	16620.0	16616.3	21.13

Table 15: PT statistics on 16-sec work
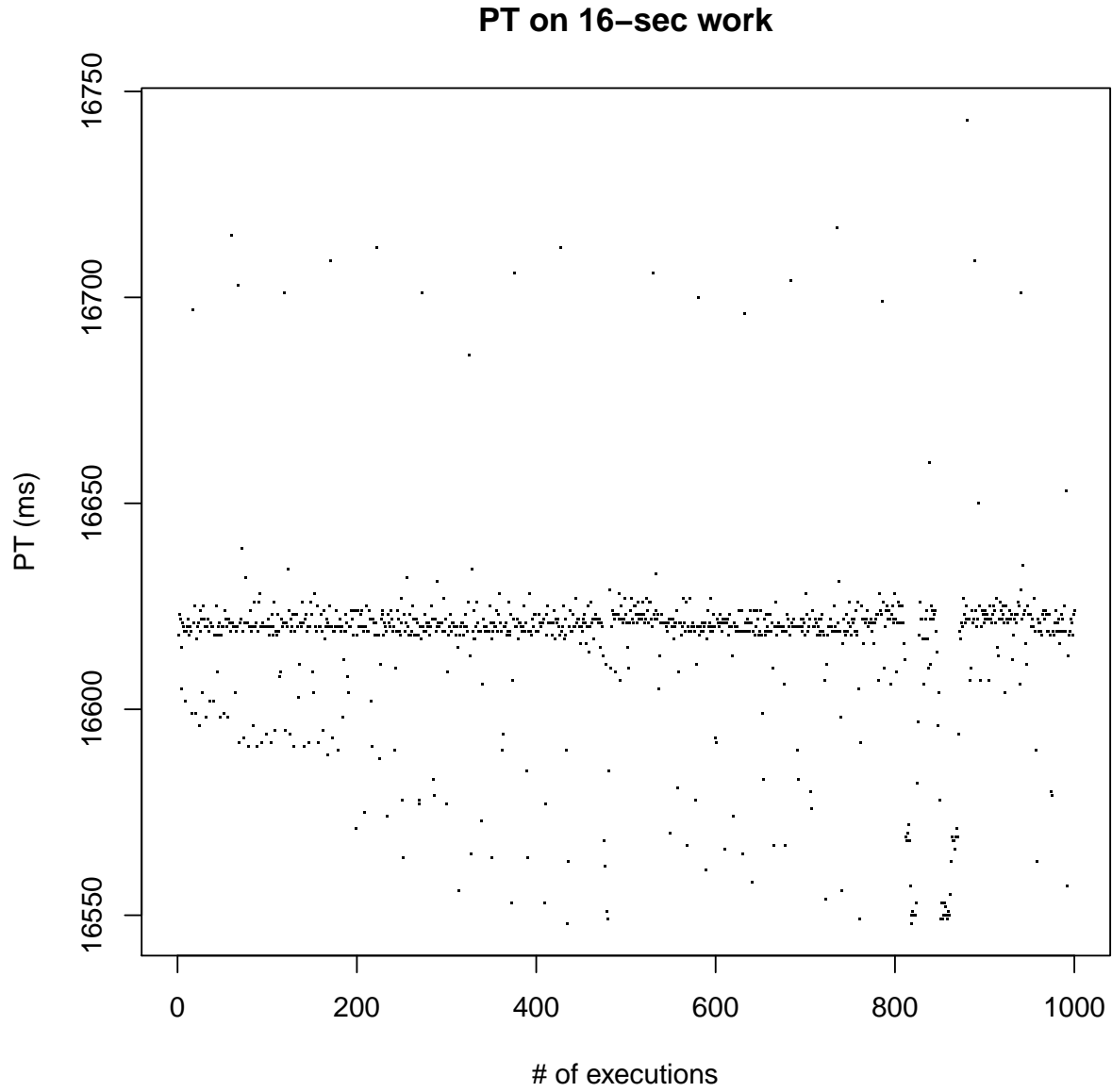
PT on 16–sec work

Figure 27: Per-execution PT on 16-sec work
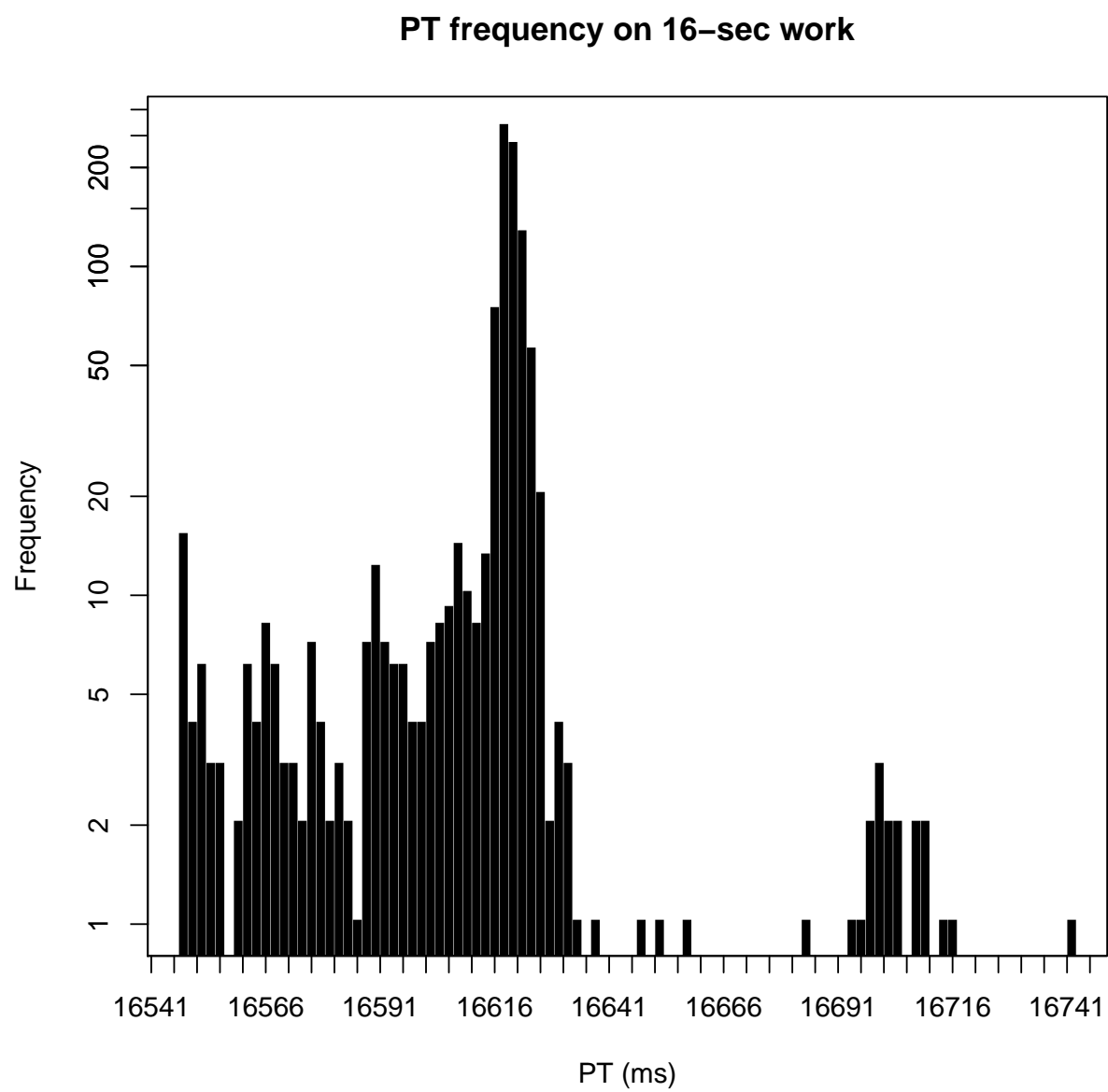
PT frequency on 16−sec work

Figure 28: PT histogram by frequency on 16-sec work

2.5.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	0	521	6.0	11.8	34.54

Table 16: TD statistics on 16-sec work

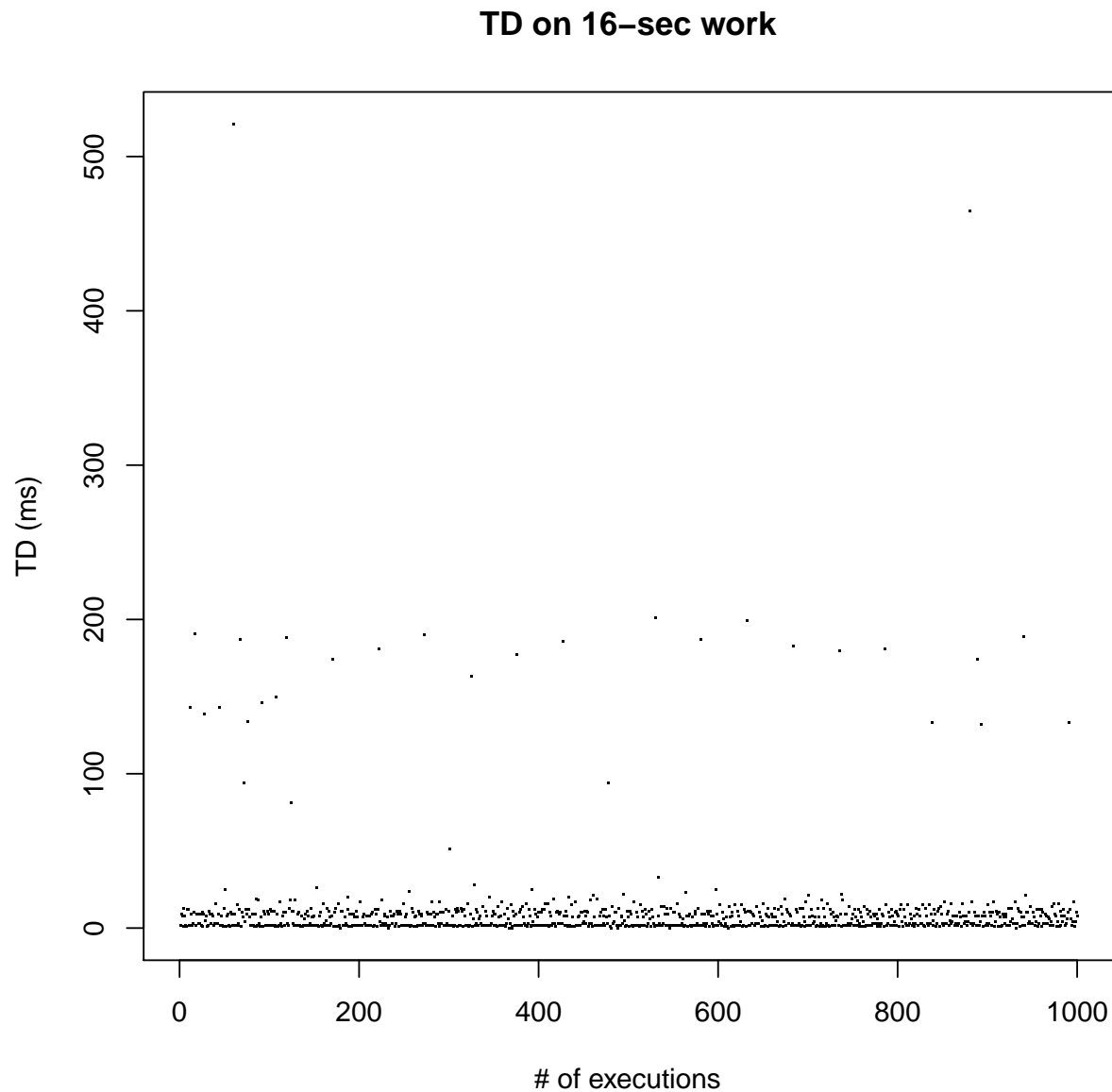**TD on 16–sec work**

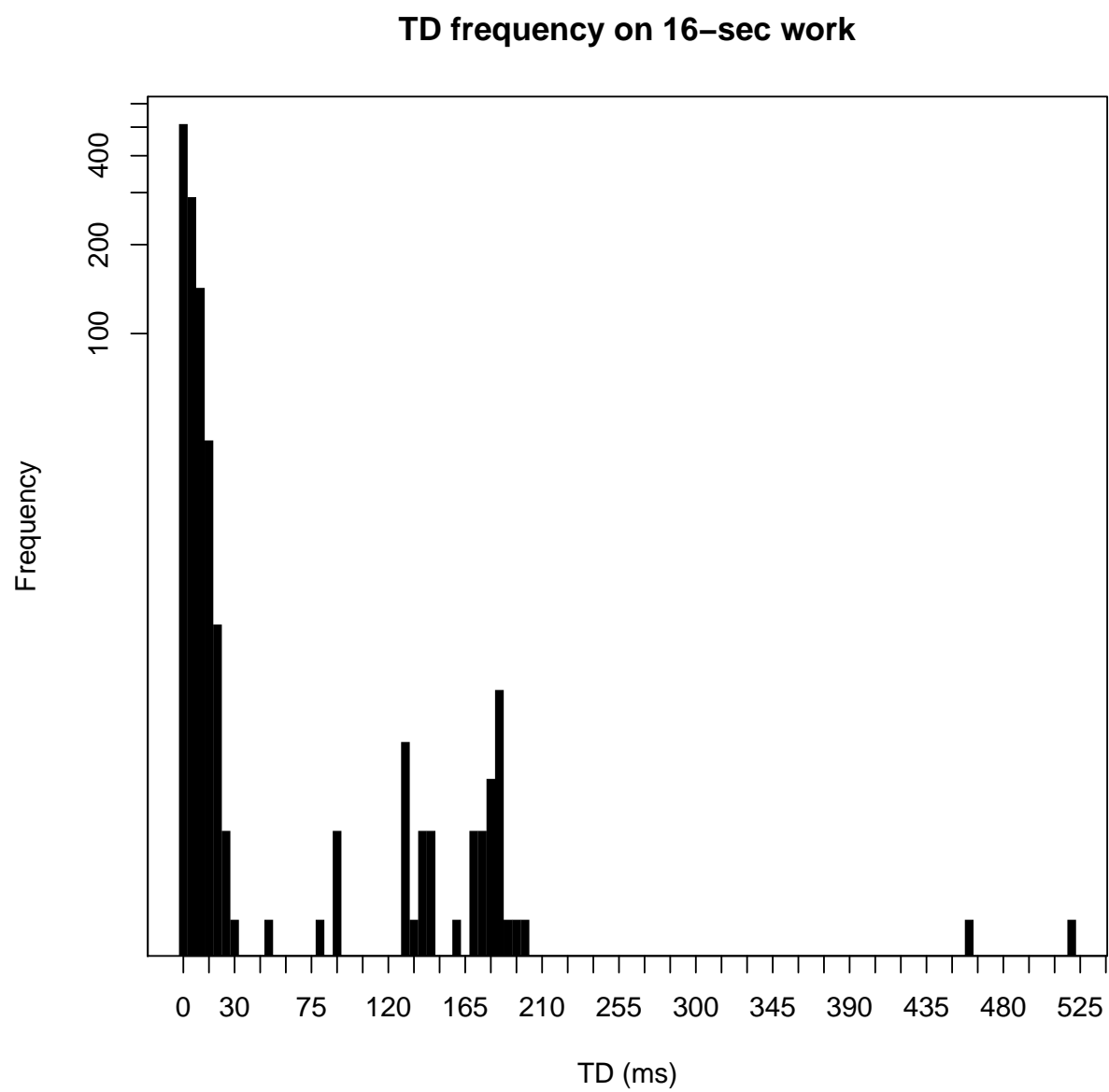Figure 29: Per-execution TD on 16-sec work

TD frequency on 16–sec work

Figure 30: TD histogram by frequency on 16-sec work

2.6 32 Second

2.6.1 Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	33114	33884	33255.0	33276.9	91.91

Table 17: Measured time statistics on 32-sec work

MT Diff. (raw – min.) on 32–sec work
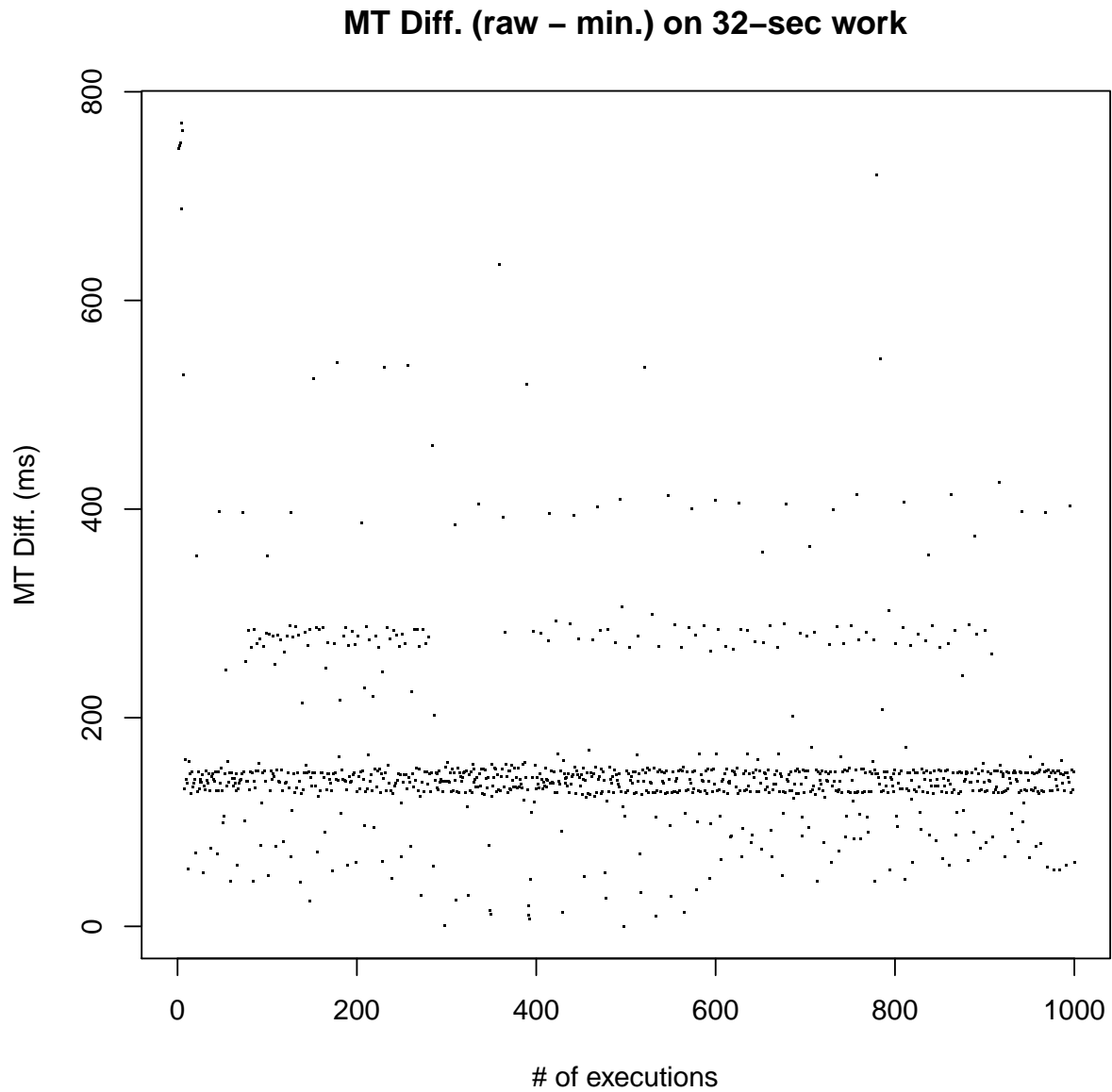
Figure 31: Per-execution MT difference (raw - min) on 32-sec work

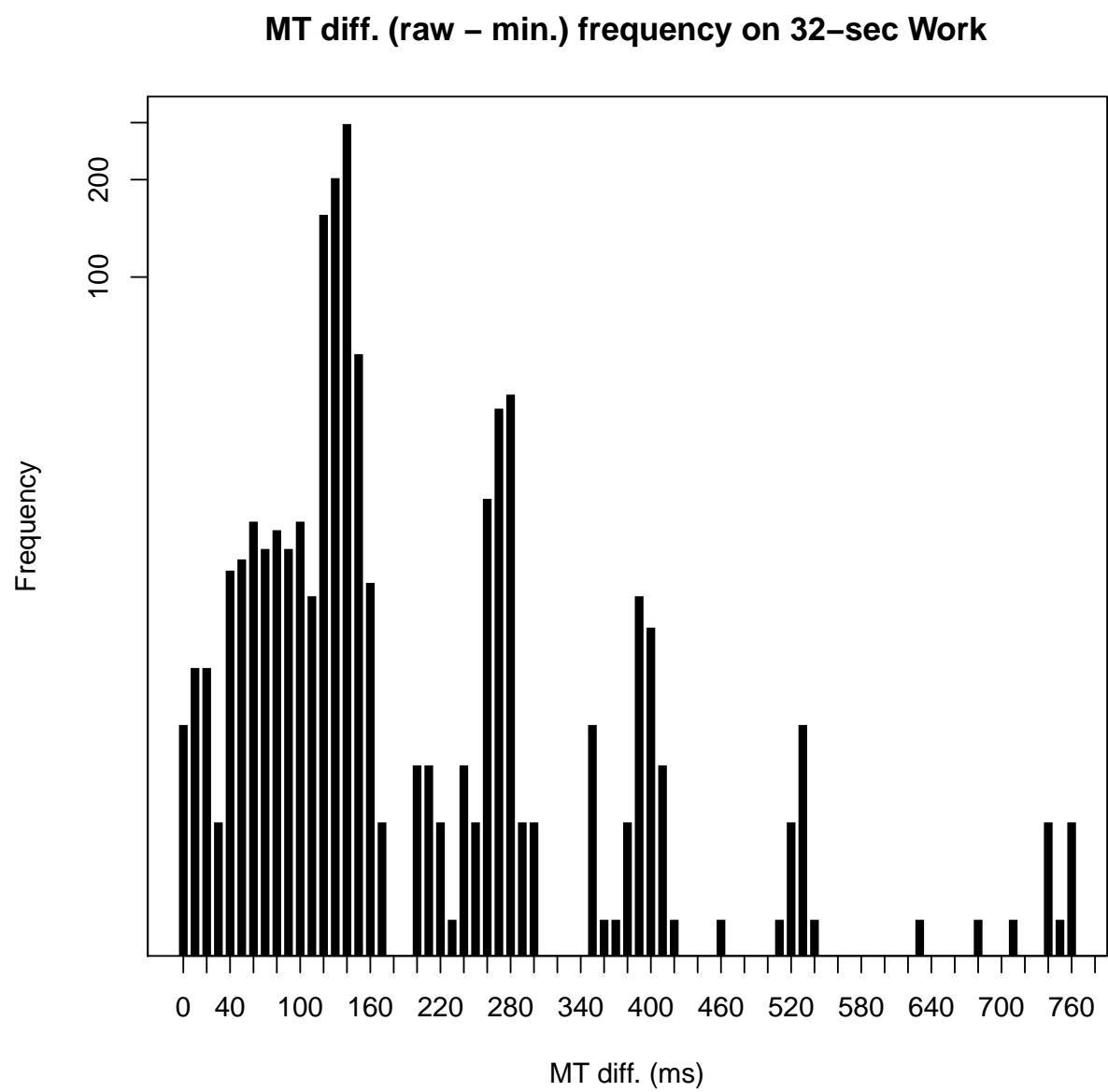# MT diff. (raw – min.) frequency on 32–sec Work

Figure 32: MT difference histogram by frequency on 32-sec work

2.6.2 Program-Under-Test Time (PT)

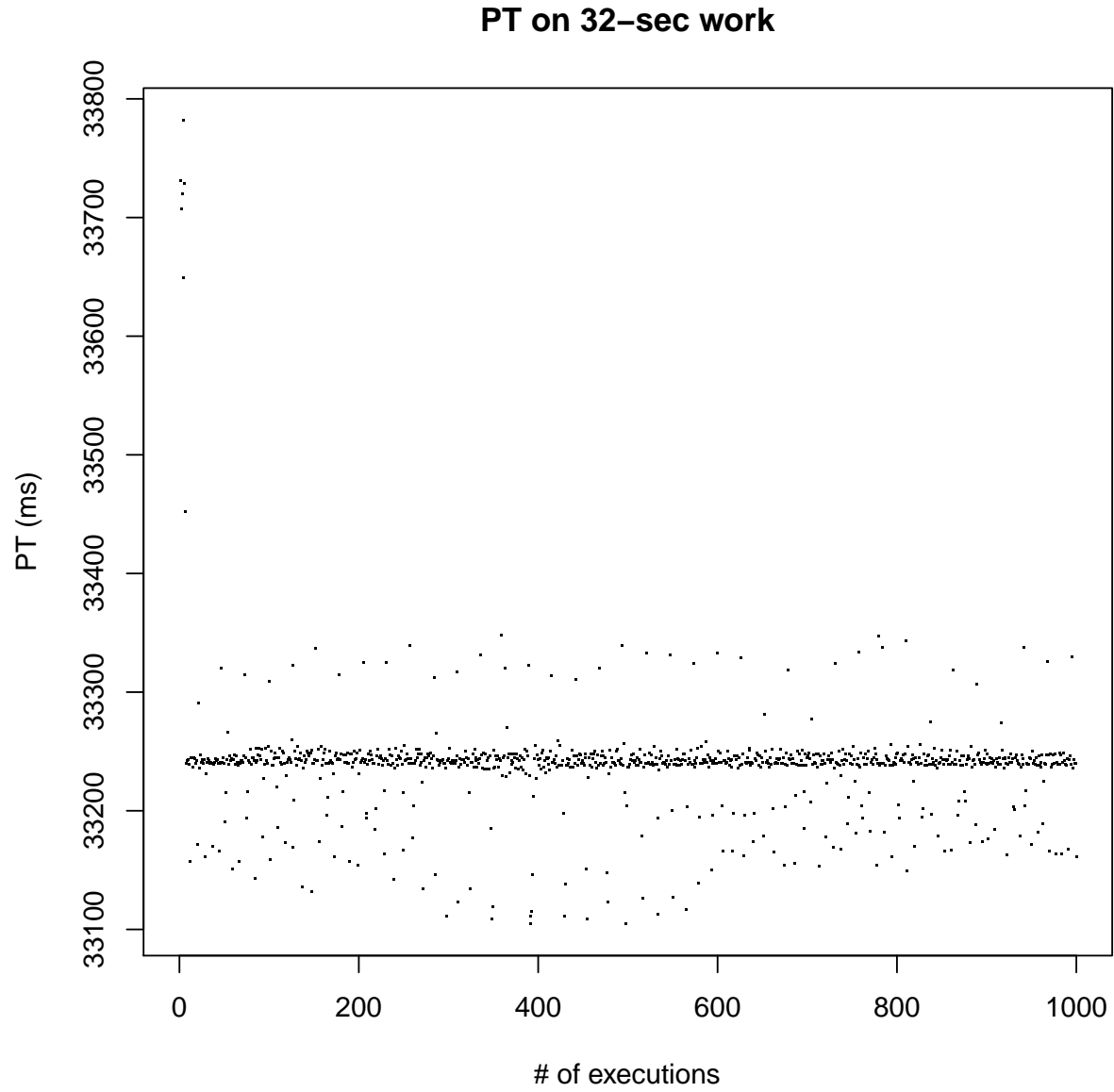|	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	33105	33782	33242.0	33239.3	49.76

Table 18: PT statistics on 32-sec work

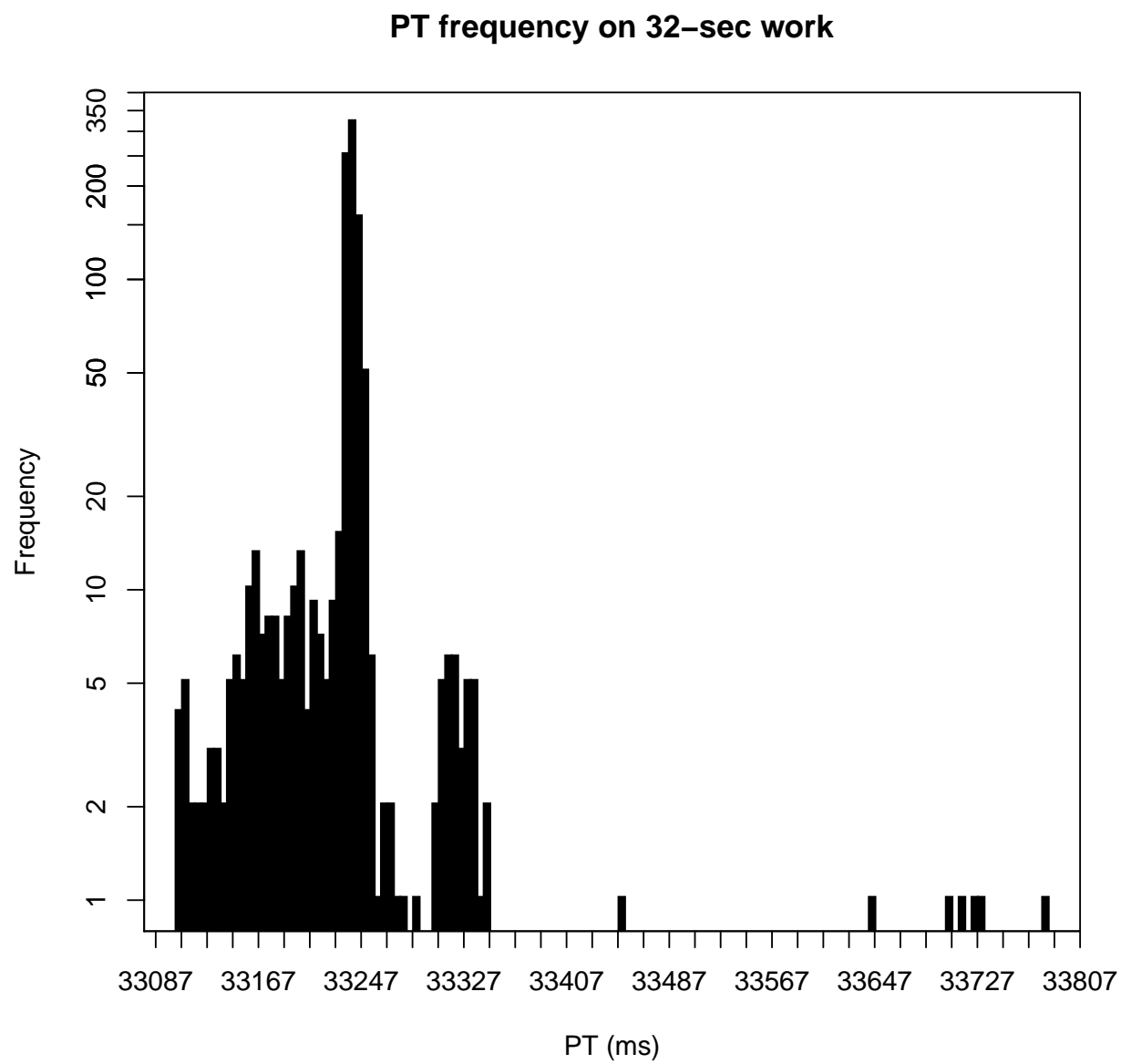Figure 33: Per-execution PT on 32-sec work

Figure 34: PT histogram by frequency on 32-sec work

2.6.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	2	487	15.0	37.6	60.04

Table 19: TD statistics on 32-sec work
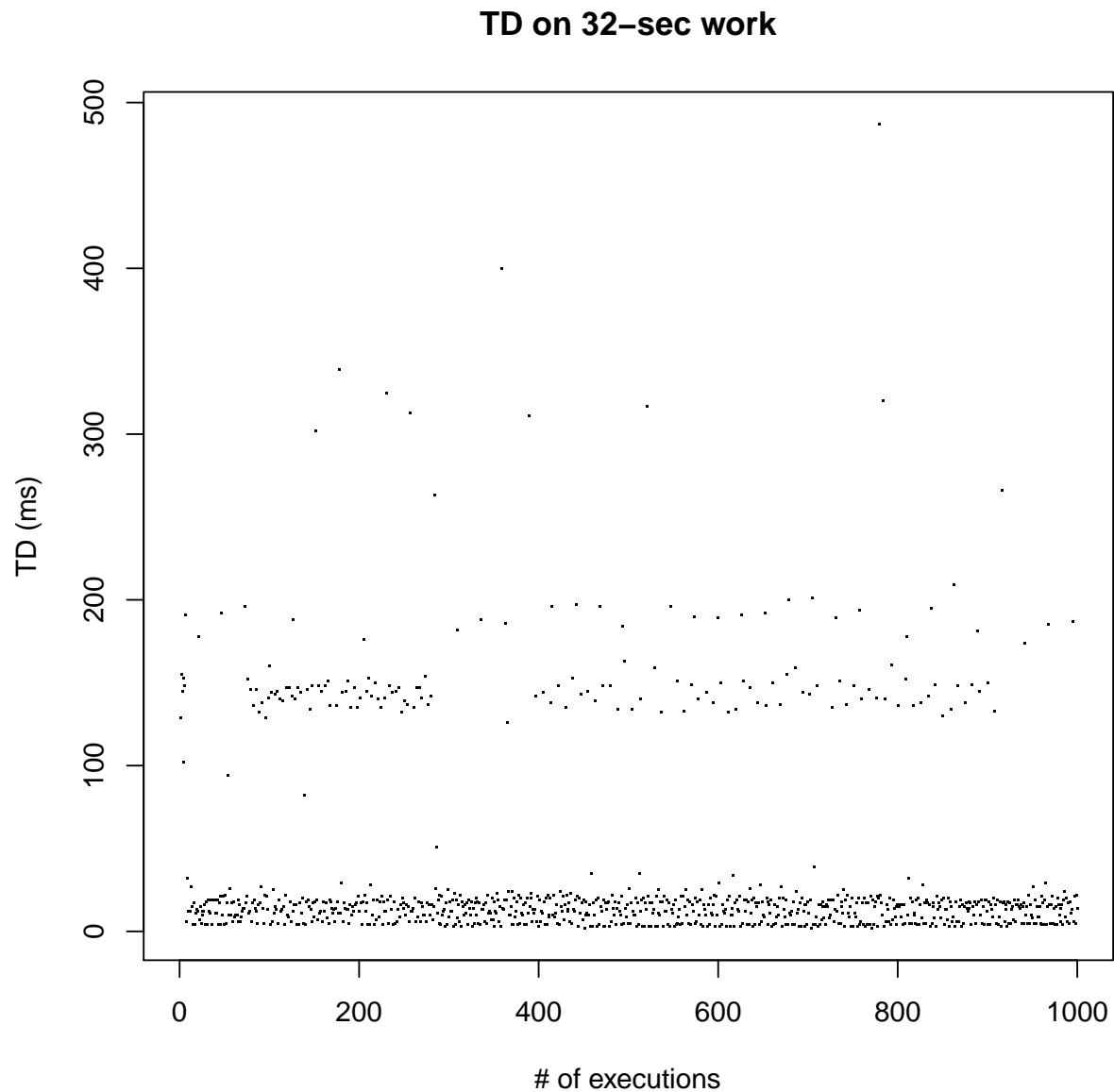
TD on 32–sec work

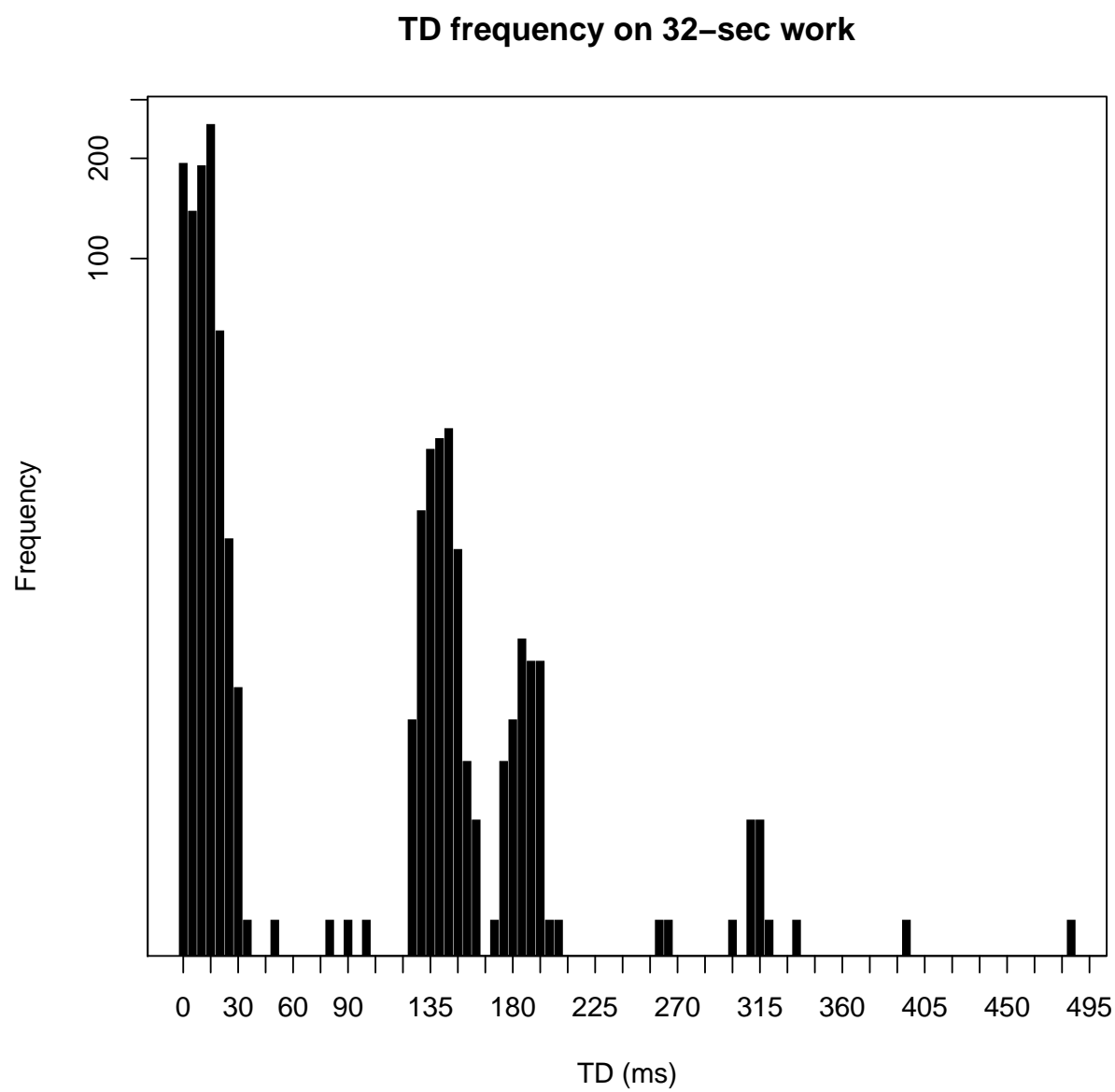Figure 35: Per-execution TD on 32-sec work

Figure 36: TD histogram by frequency on 32-sec work

2.7   64 Second

2.7.1   Measured Time (MT)

	Min. MT (ms)	Max. MT (ms)	Med. MT (ms)	Avg. MT (ms)	S.D. of MT
1000 executions	66226	81006	66507.0	66556.9	470.22

Table 20: Measured time statistics on 64-sec work

MT Diff. (raw – min.) on 64–sec work
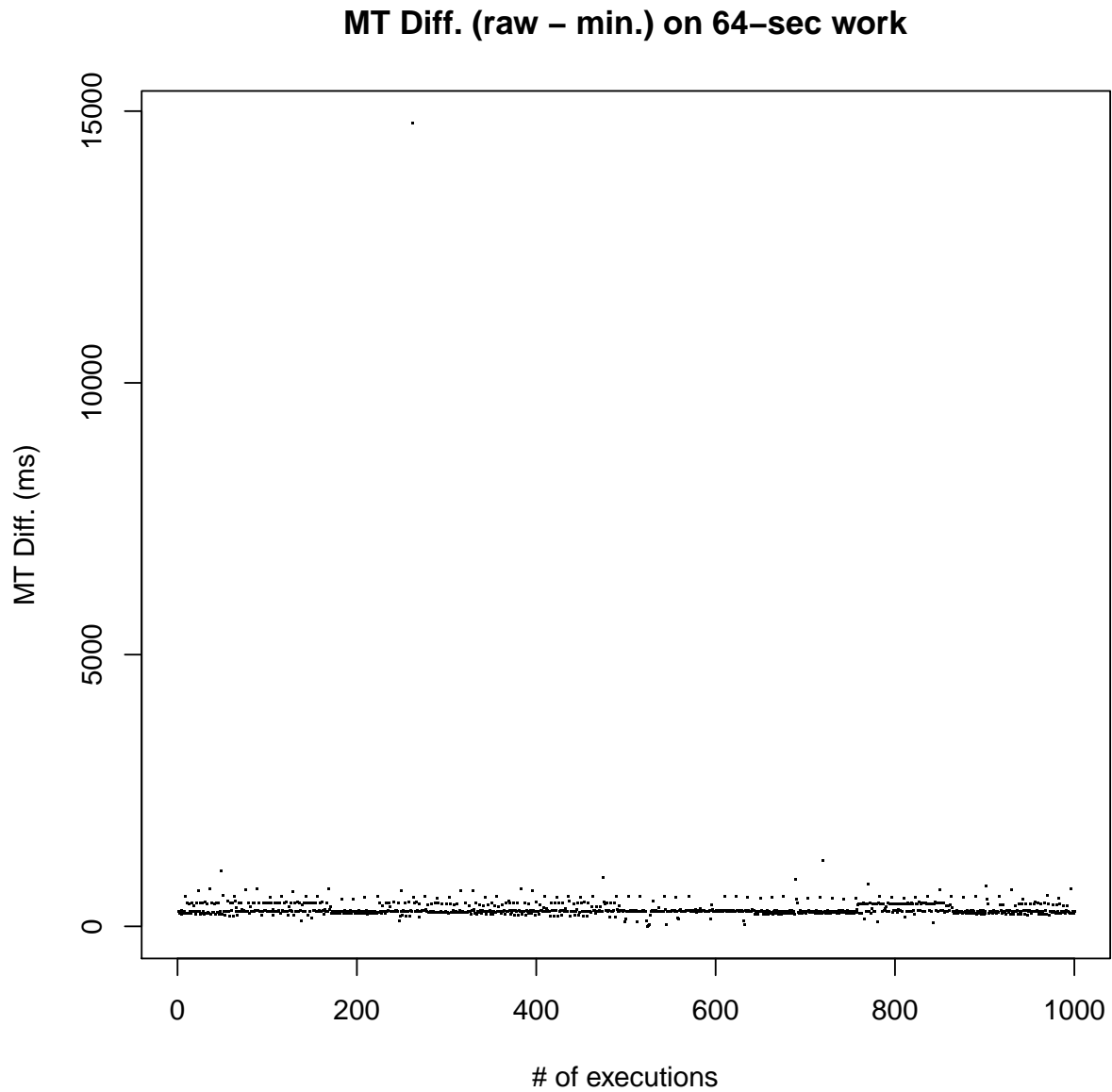
Figure 37: Per-execution MT difference (raw - min) on 64-sec work

MT diff. (raw – min.) frequency on 64–sec Work

Figure 38: MT difference histogram by frequency on 64-sec work

2.7.2 Program-Under-Test Time (PT)

	Min. PT (ms)	Max. PT (ms)	Med. PT (ms)	Avg. PT (ms)	S.D. of PT
1000 executions	66200	67238	66483.0	66473.9	54.48

Table 21: PT statistics on 64-sec work

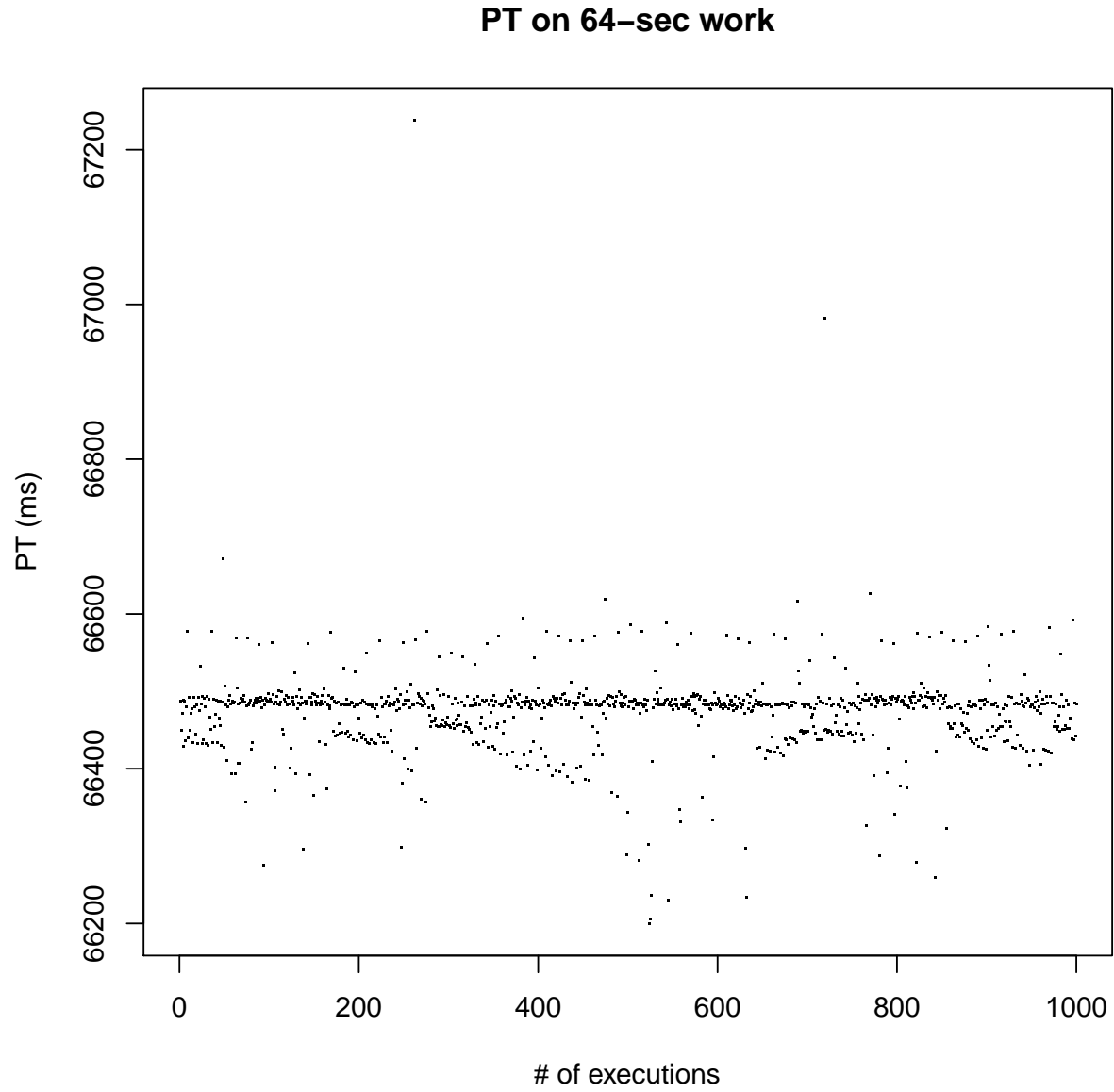## PT on 64–sec work

Figure 39: Per-execution PT on 64-sec work

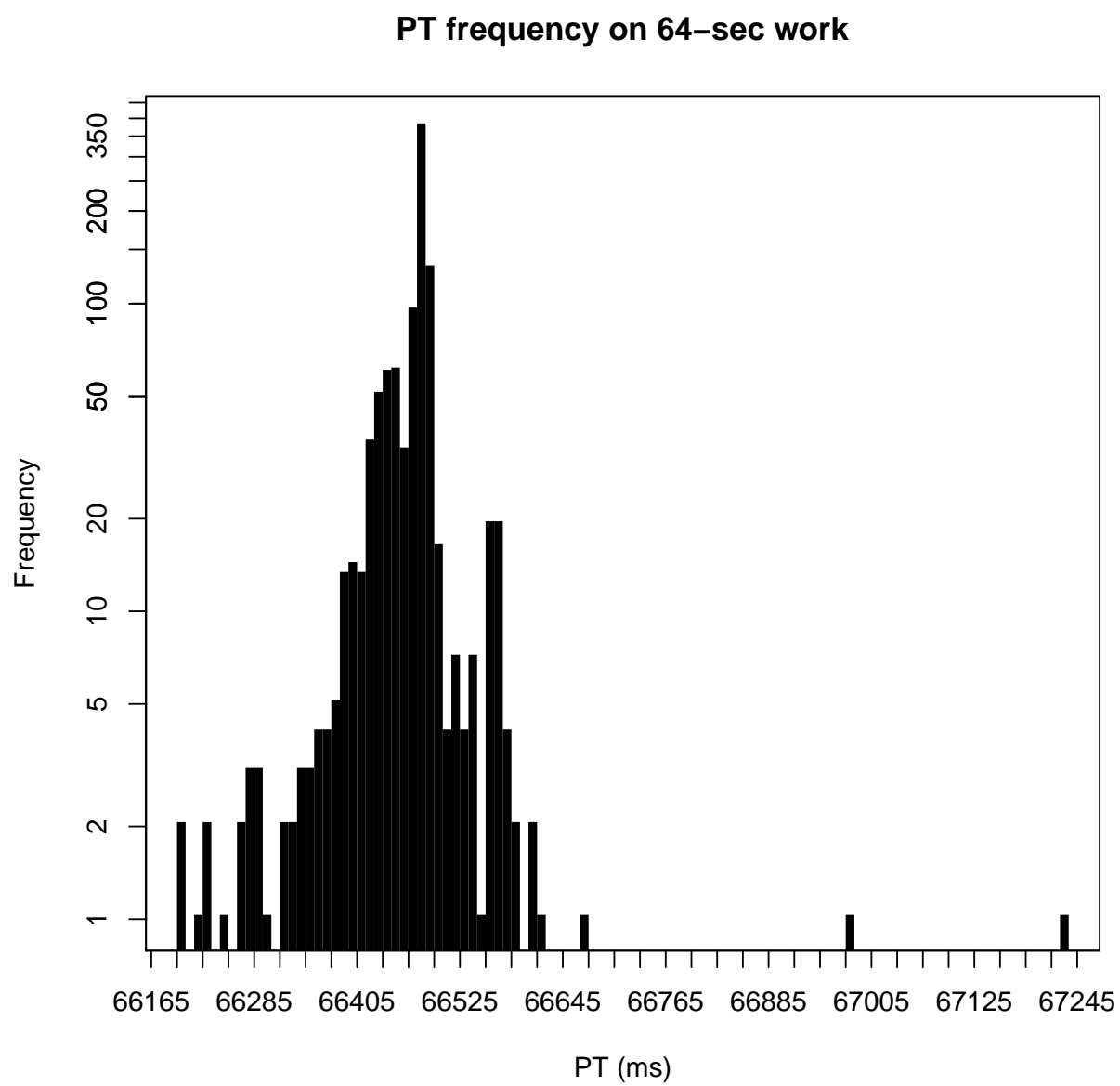# PT frequency on 64–sec work

Figure 40: PT histogram by frequency on 64-sec work

2.7.3 Time Difference (TD) between MT and PT

	Min. TD (ms)	Max. TD (ms)	Med. TD (ms)	Avg. TD (ms)	S.D. of TD
1000 executions	17	13768	26.5	83.0	440.28

Table 22: TD statistics on 64-sec work
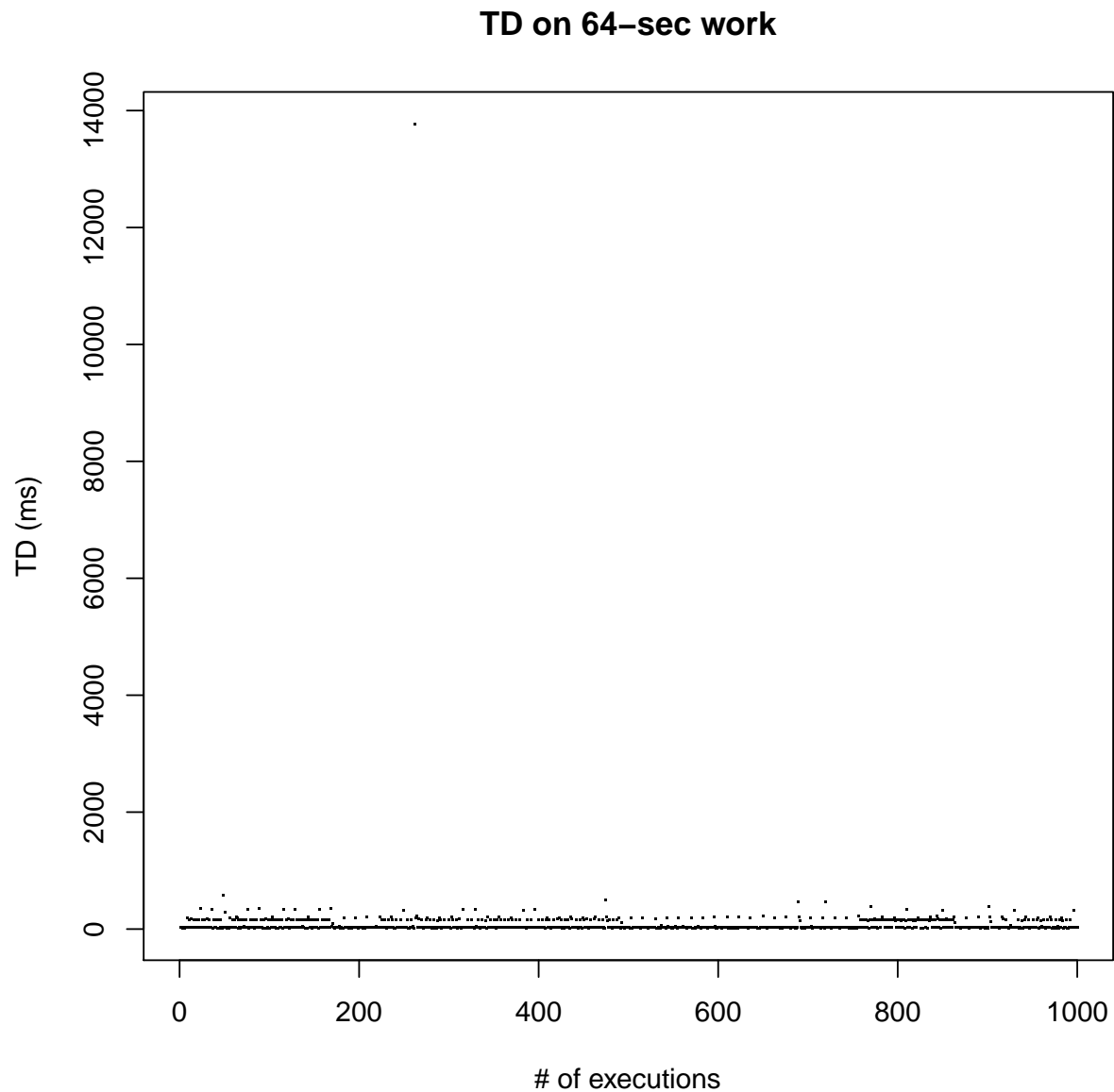
TD on 64–sec work

Figure 41: Per-execution TD on 64-sec work

TD frequency on 64–sec work

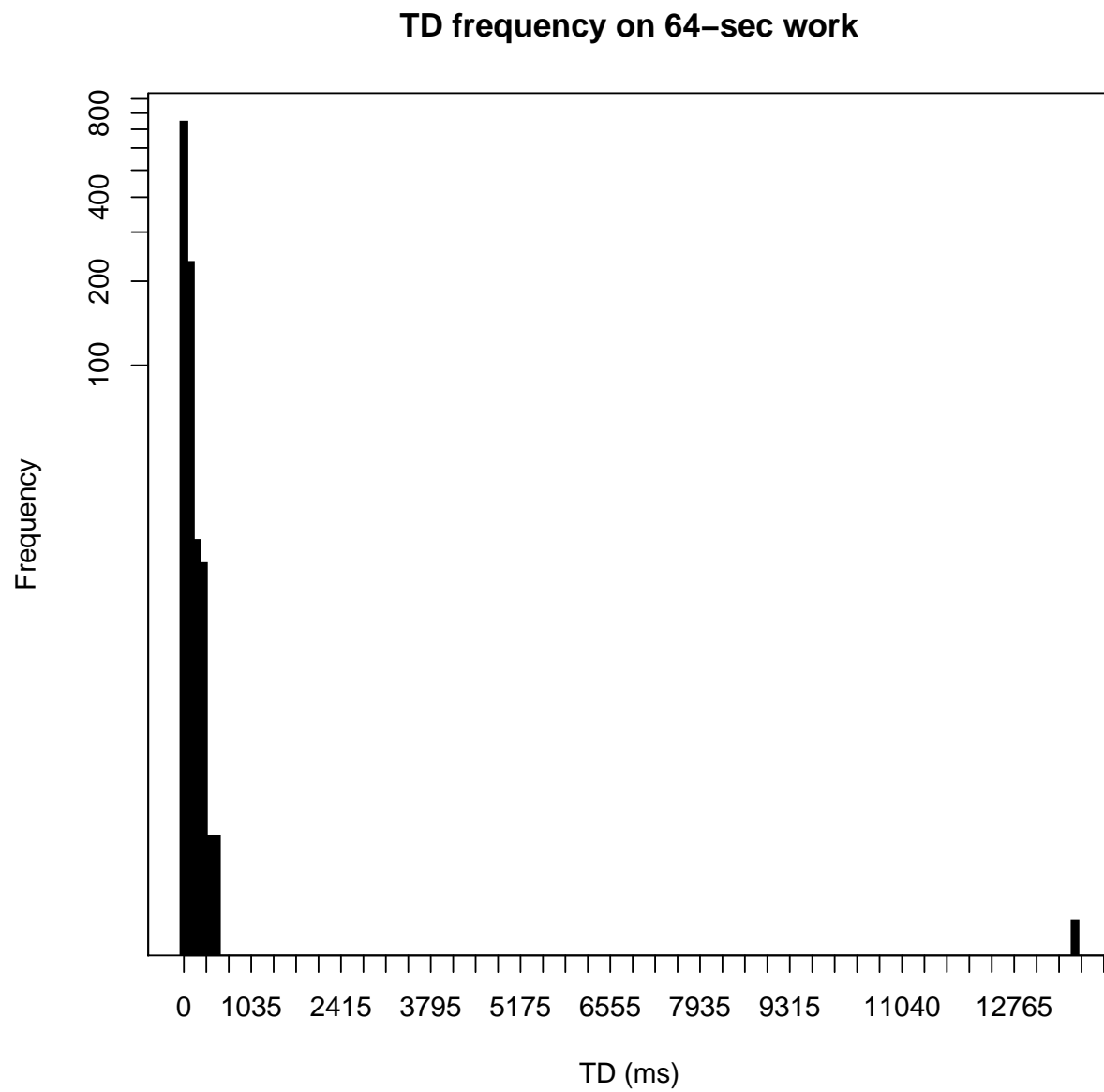
Figure 42: TD histogram by frequency on 64-sec work

3   Overall

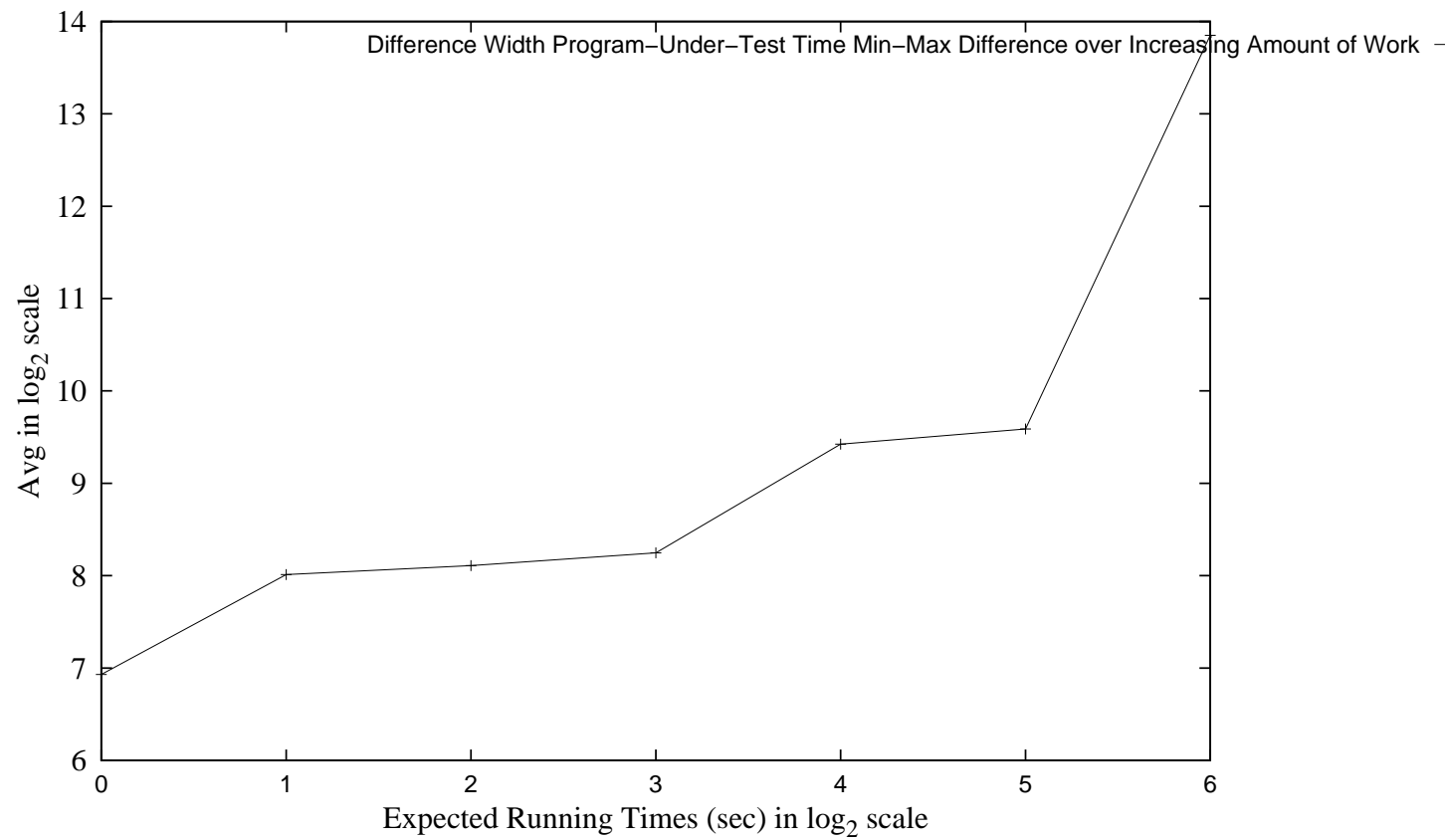## 3.1   Program-Under-Test Time Min-Max Difference

Figure 43: Average Program-Under-Test Time Min-Max Difference in $\log_2$ scale over increasing amount of work
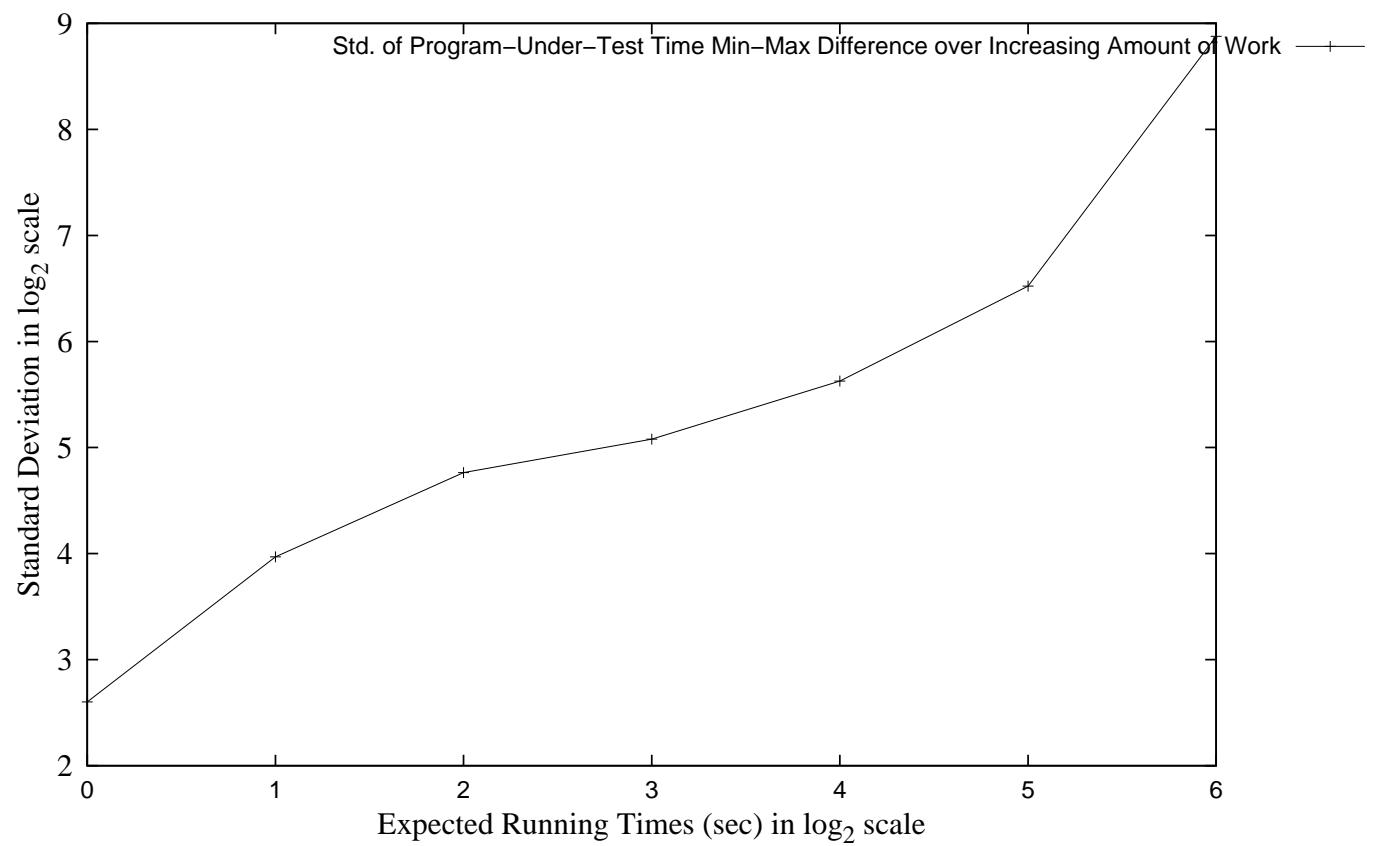
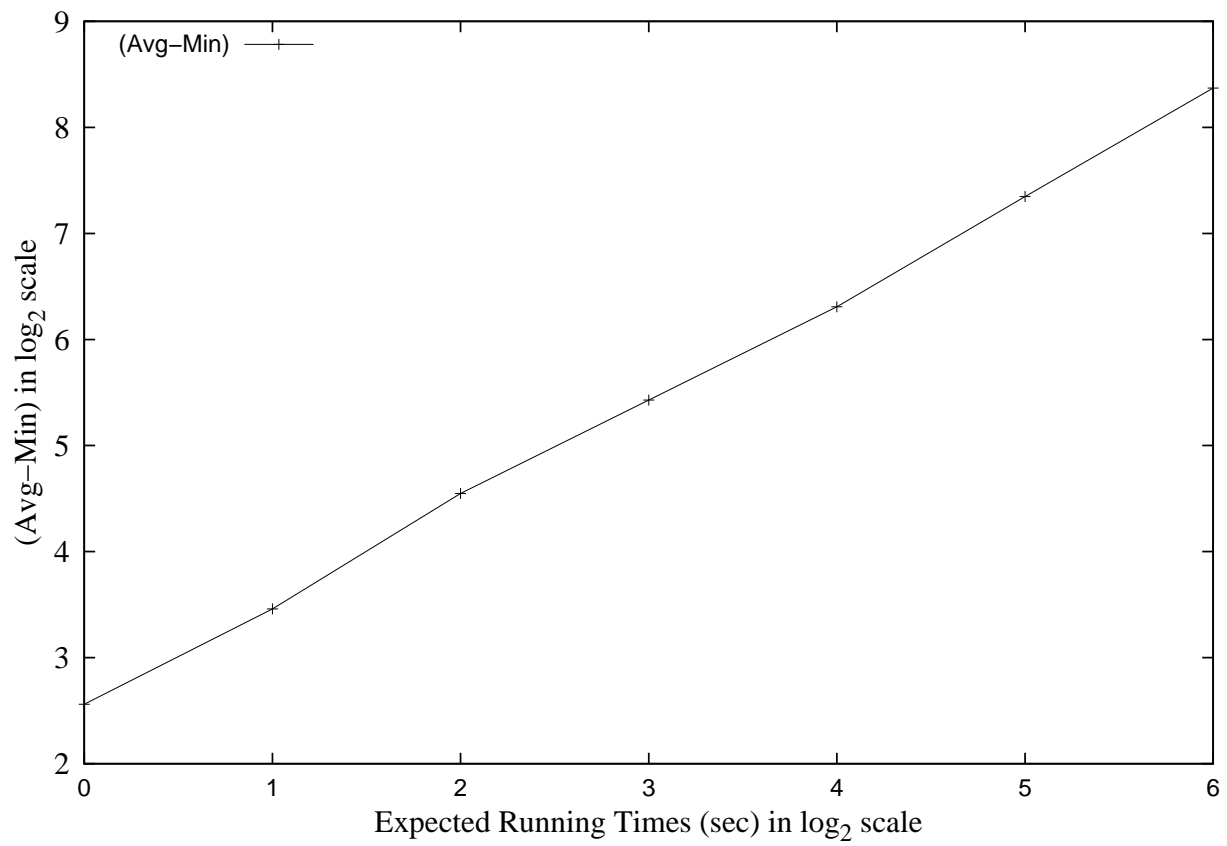Figure 44: Std. of Program-Under-Test Time Min-Max Difference in $\log_2$ scale over increasing amount of work

Figure 45: Average-Minimum Program-Under-Test Time Min-Max Difference in $\log_2$ scale over increasing amount of work