

DVFS

THE LAWS OF DIMINISHING RETURNS

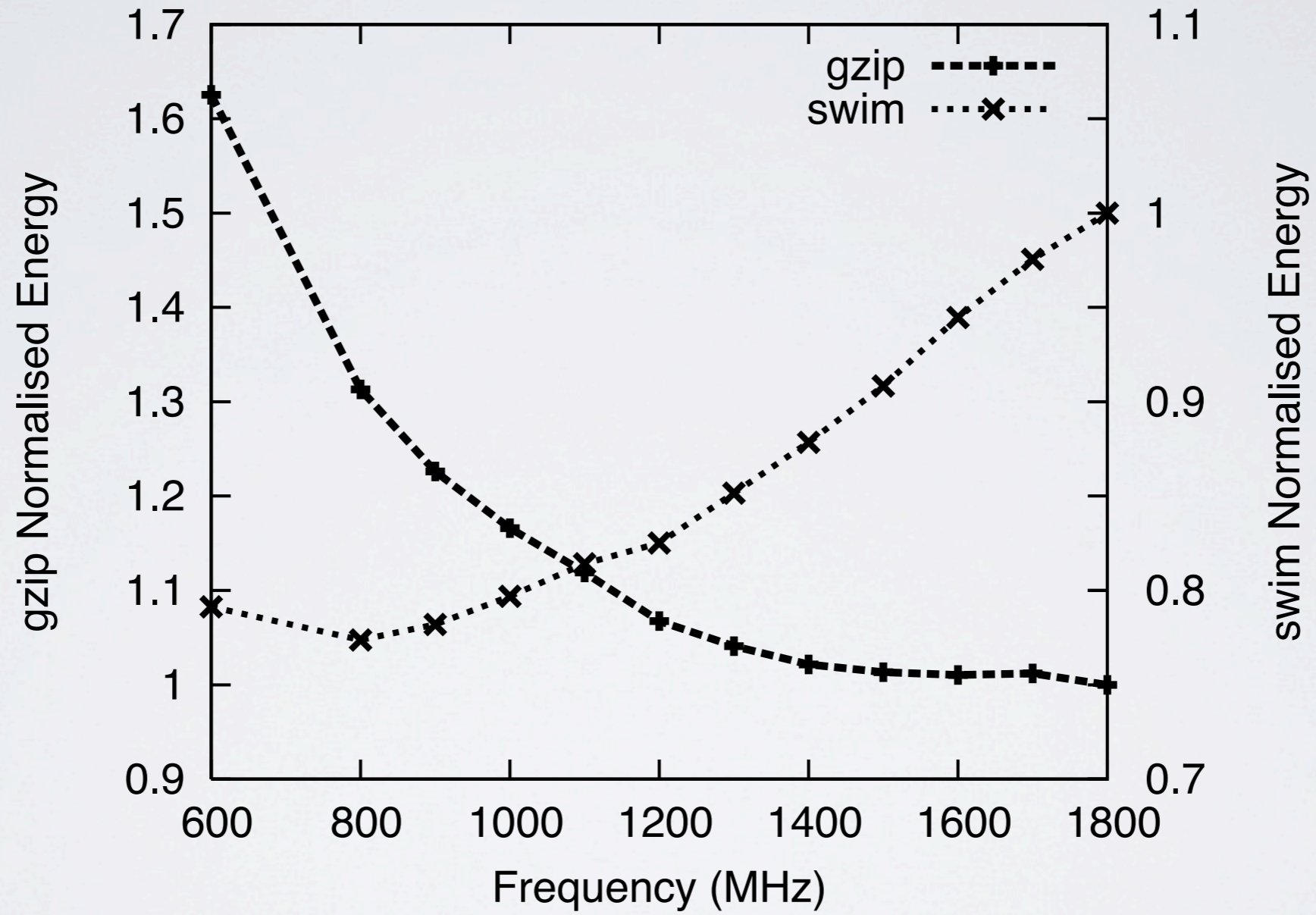
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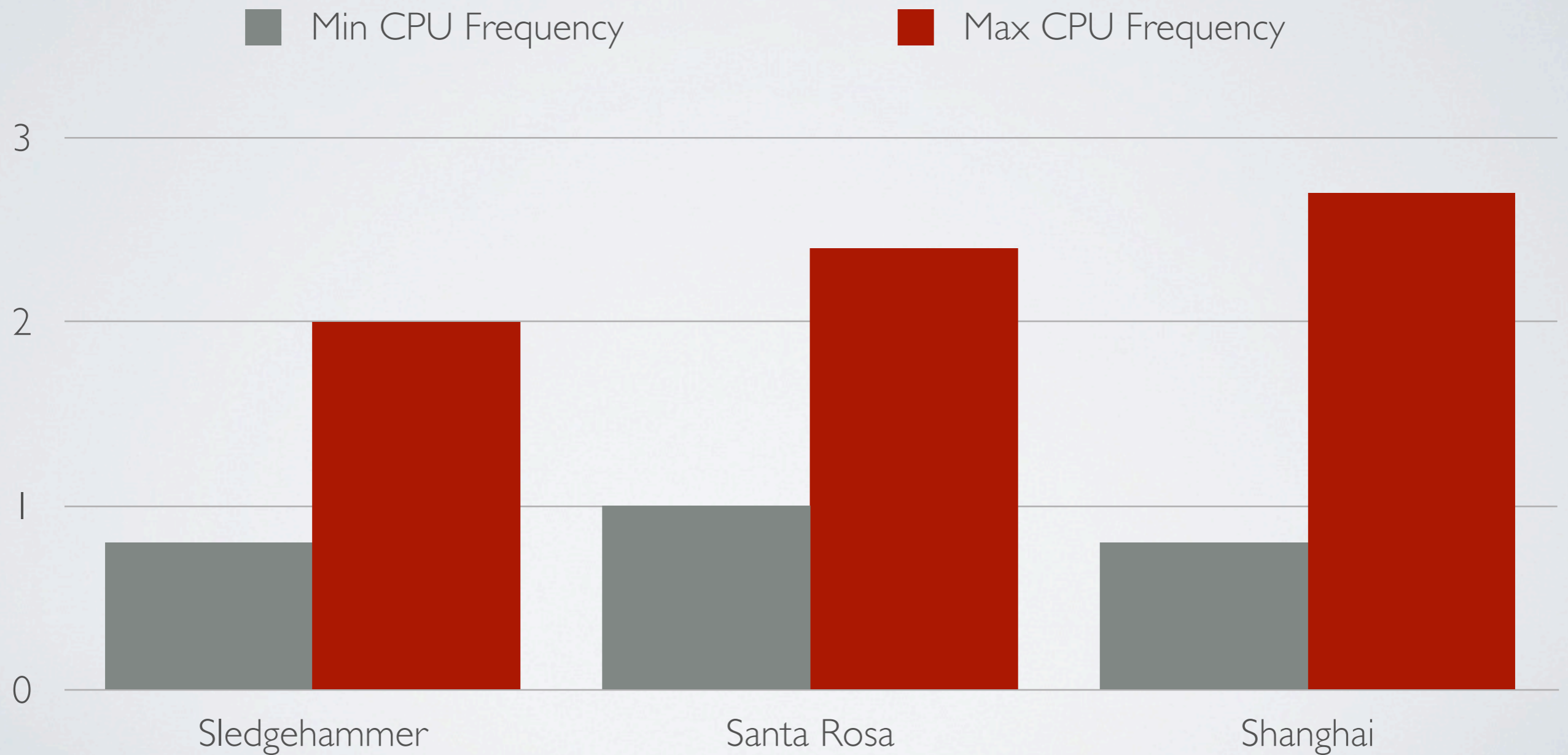
DVFS

$$P = C f V^2 + P_{static}$$

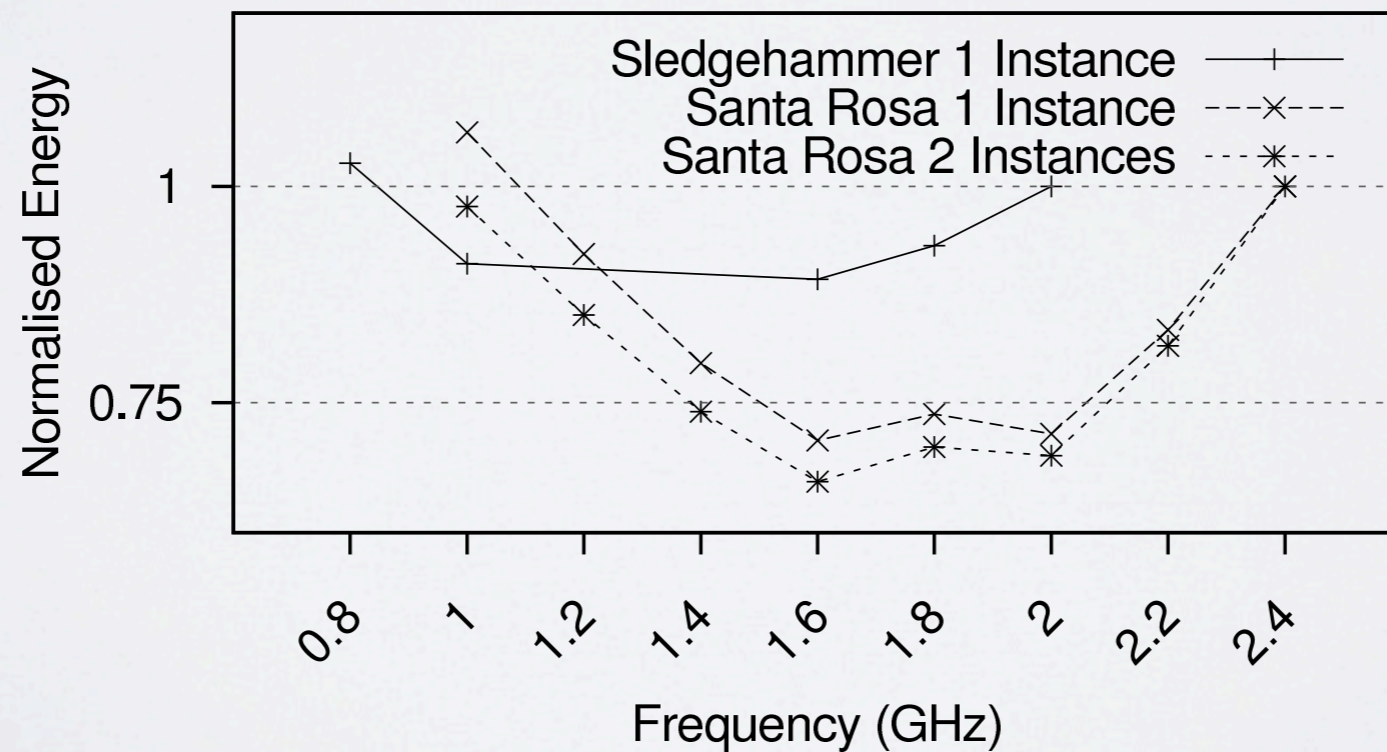
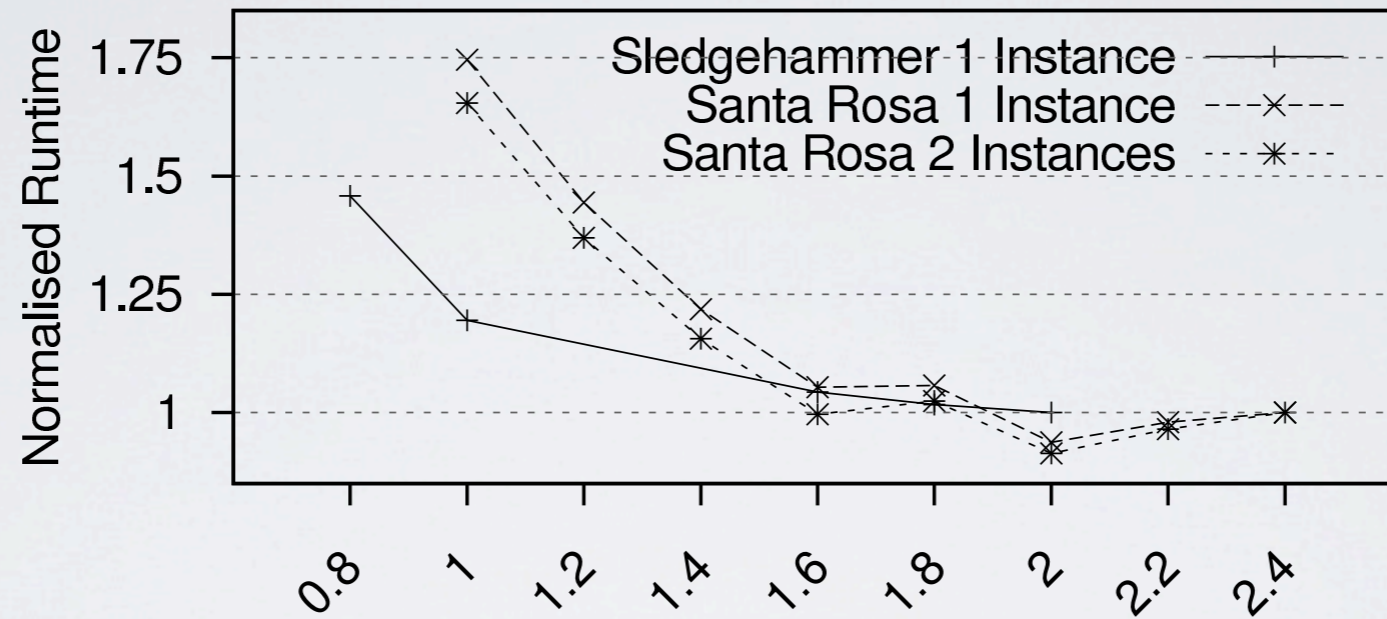
DVFS



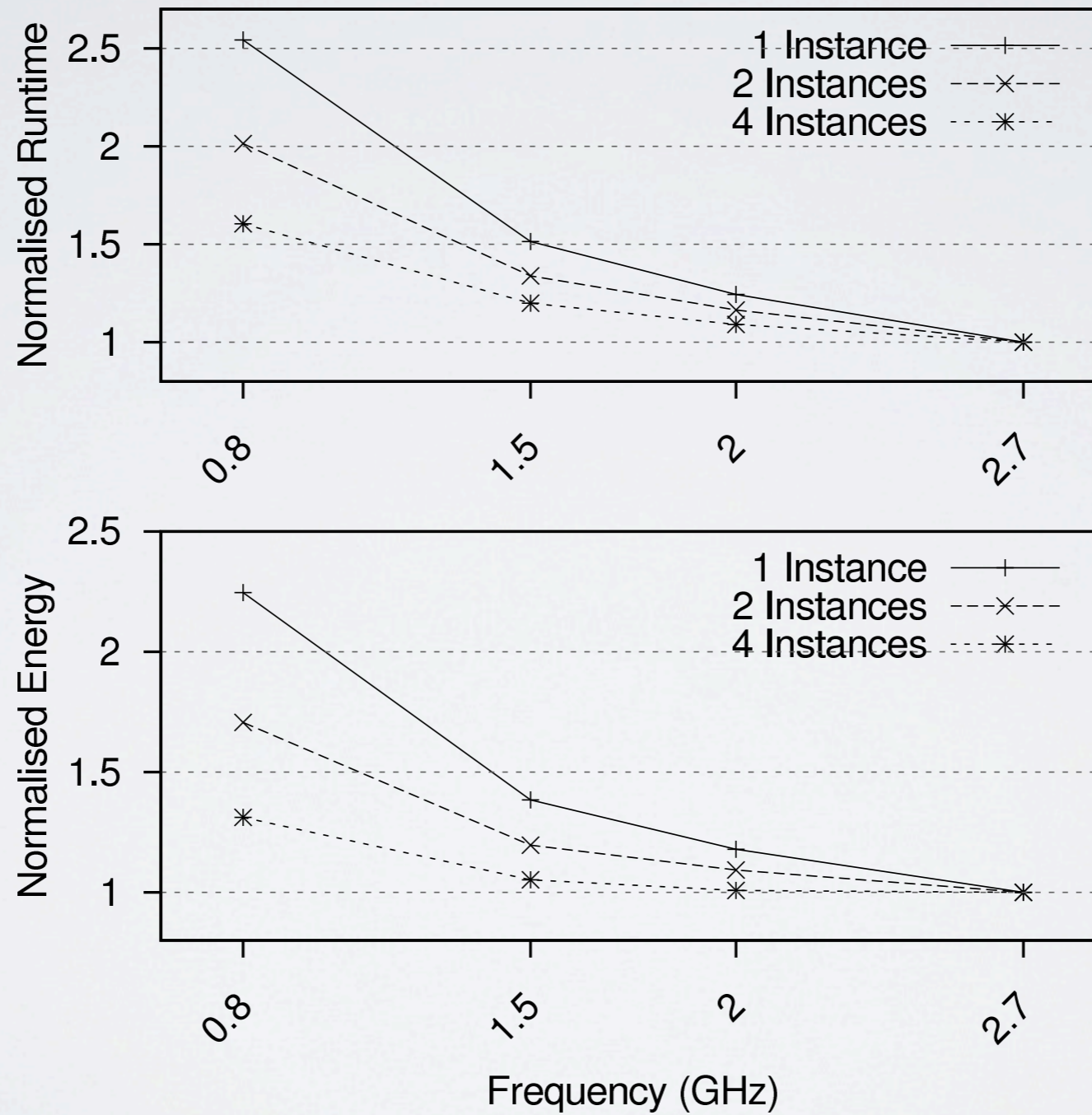
TEST SYSTEMS



REALITY CHECK



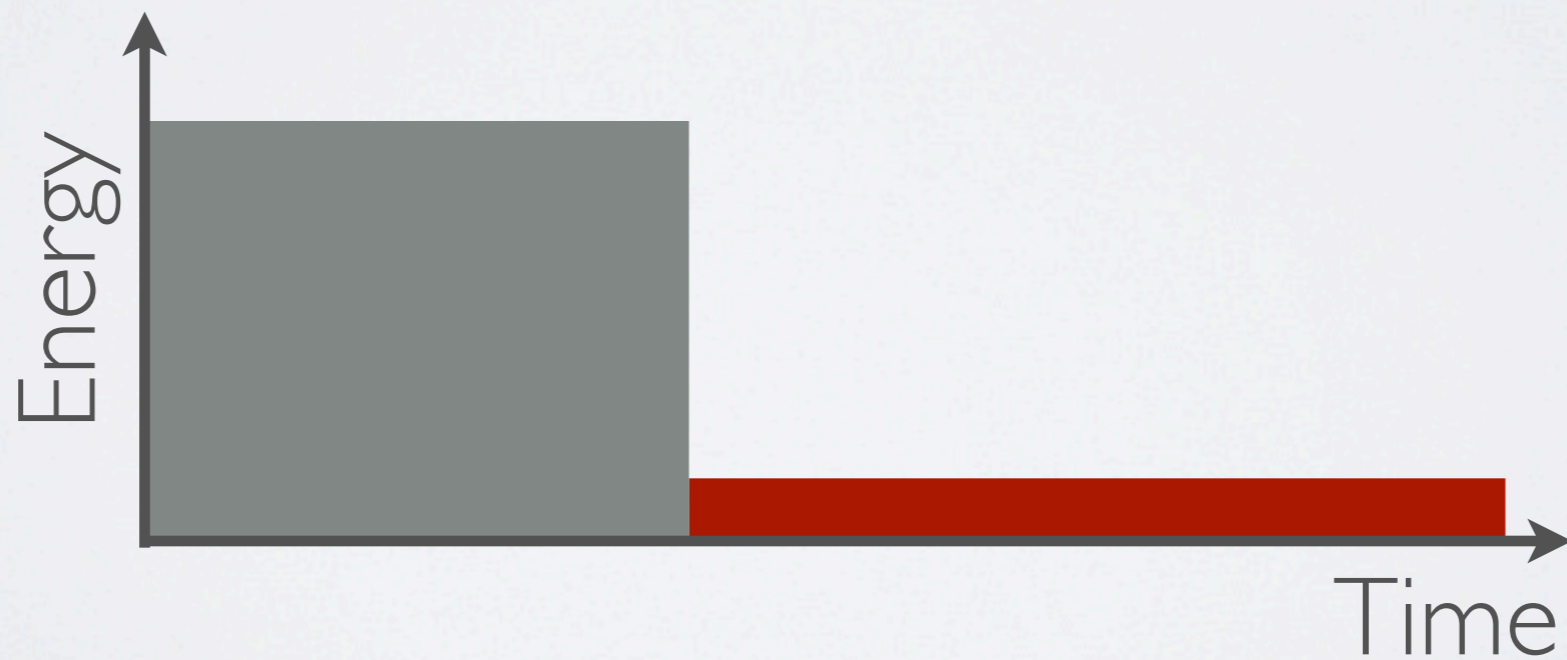
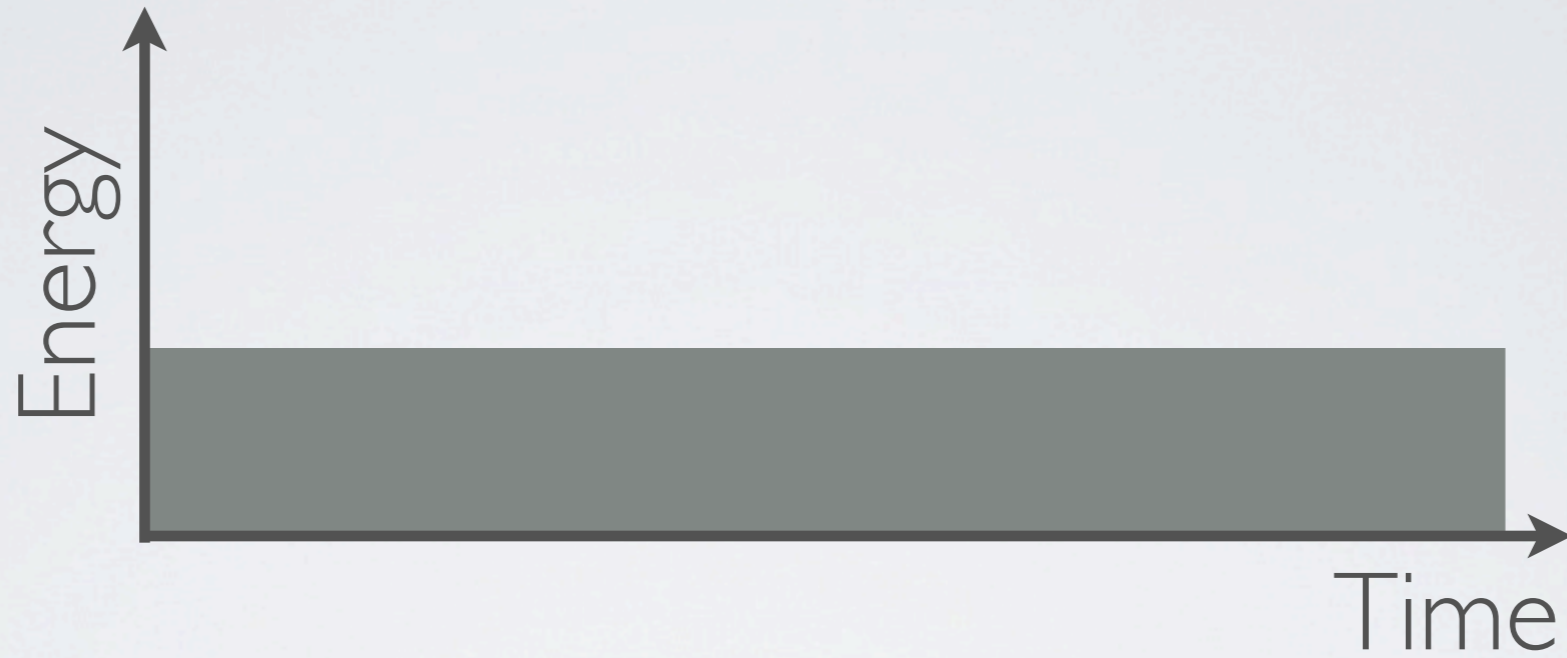
REALITY CHECK



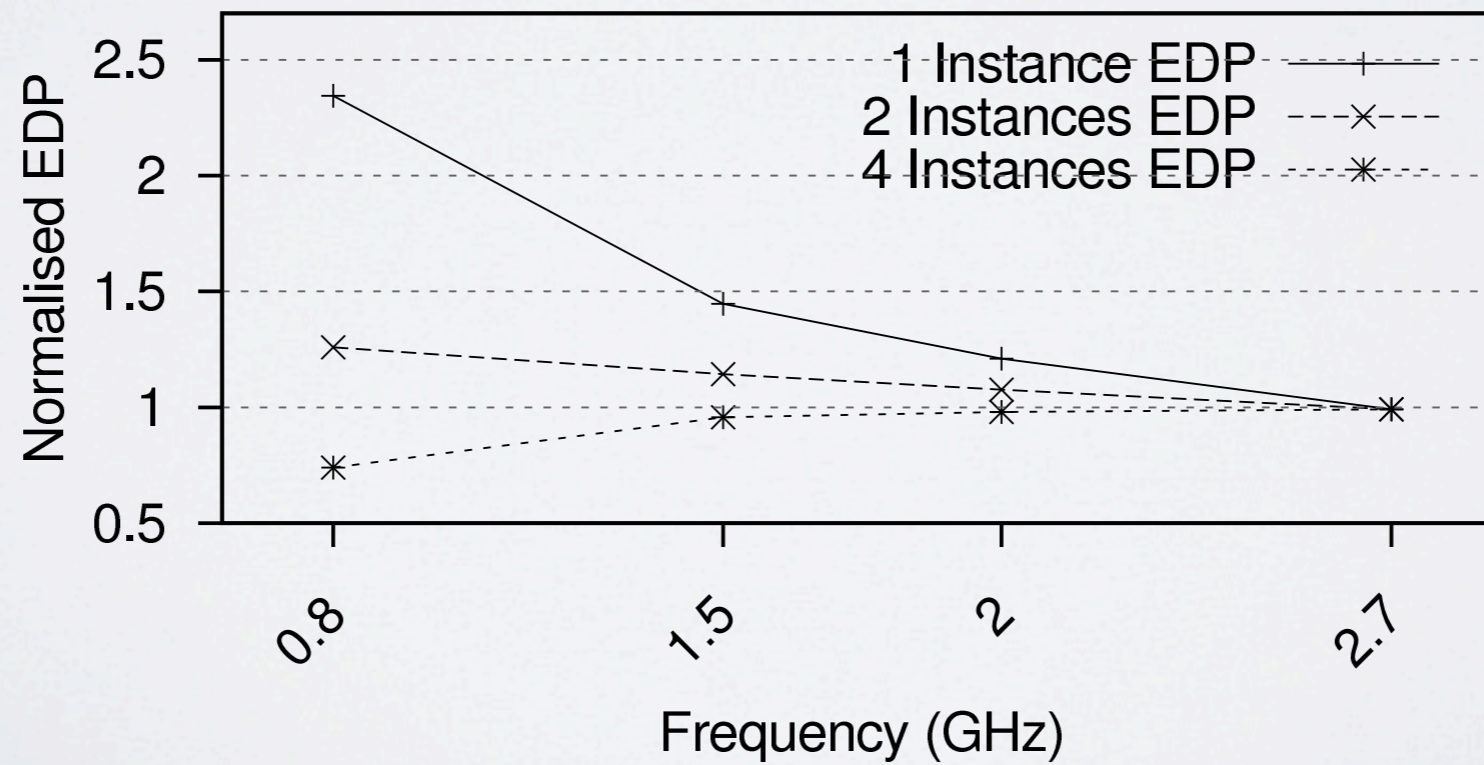
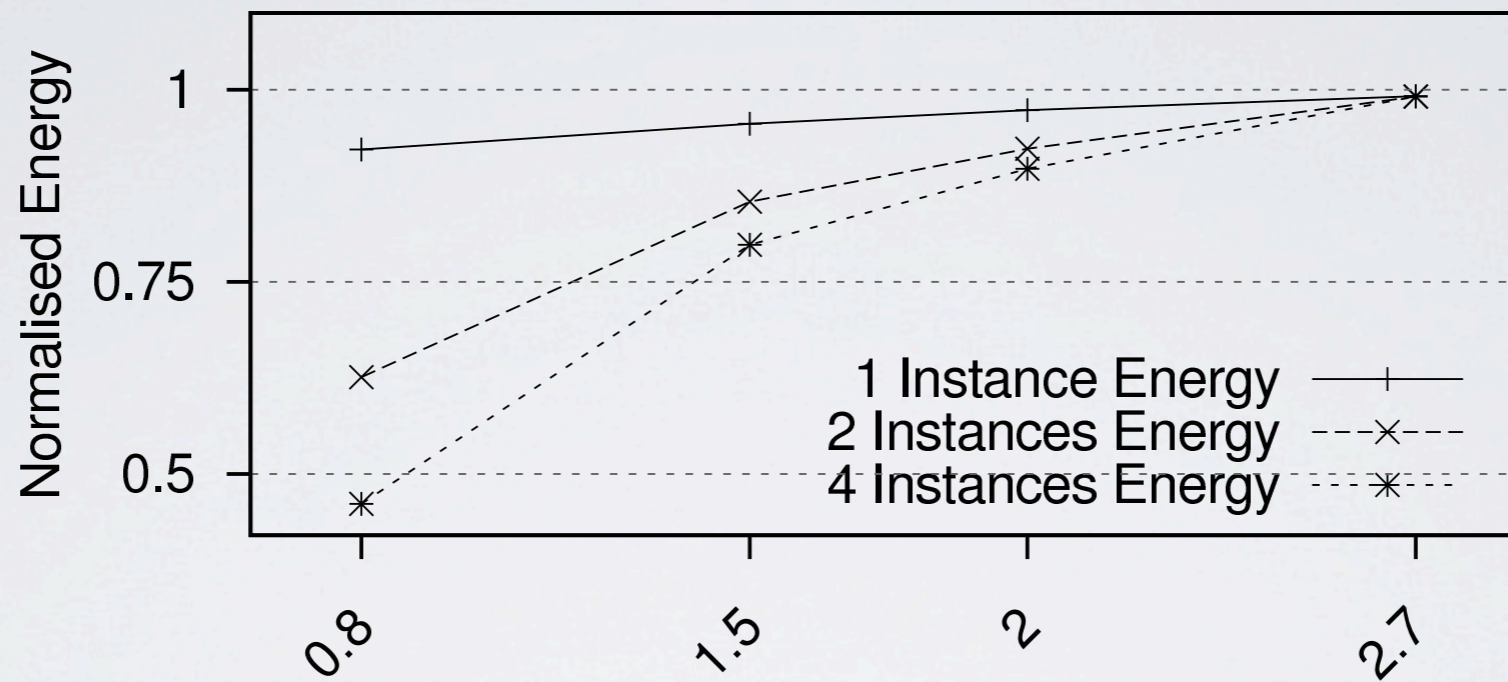
REASONS

- scaling of silicon transistor technology
- increasing memory performance
- improved idle/sleep modes
- complexity of multi-core processors

IDLE TIME



IDLE PADDING



CONCLUSION

- do not try minimizing idle time
(as Linux' ondemand governor does)
- race to idle instead
- remember: this was a worst-case
memory-bound benchmark

DISCUSSION

- CPU energy management solved?
- Will this happen to other devices?
- Is it better to have devices self-manage their energy?
- Is energy management just batching?