Fast Synthesis of High-Quality Power and Temperature Traces of Multiprocessor Systems

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Power & Temperature

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- Fundamental

Multiprocessors

- Complex

- Uncertain

Uncertainty

- Aging

- Workload

- Process variation

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Life Off Chip

- Hard

Life On Chip™

- Easier

Life On Chip™

- Actual

- Specific

Solutions

- Adaptive

- Custom-built

Strategies

- ~~Reactive~~

- Proactive

Prediction

- Machine learning

Learning

- Need data

Real Data

- Expensive

- Unavailable

- Inappropriate

Simulation Data

- Infeasible

Our Goal

- Obtain plenty of power and temperature data in no time

Target Audience

- You

Synthetic Data

- Profuse

- Convenient

- Representative

Methodology

1. Data acquisition

2. Data synthesis

Data Acquisition

- Reference arrivals

- Reference workloads

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Reference Arrivals

- Logging & monitoring
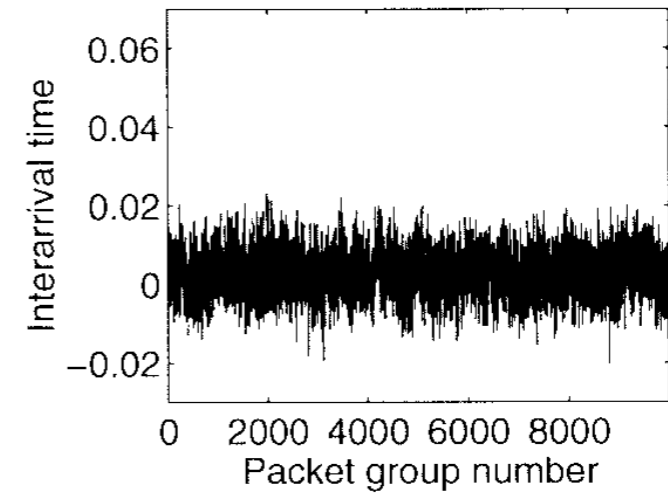
Reference Workloads
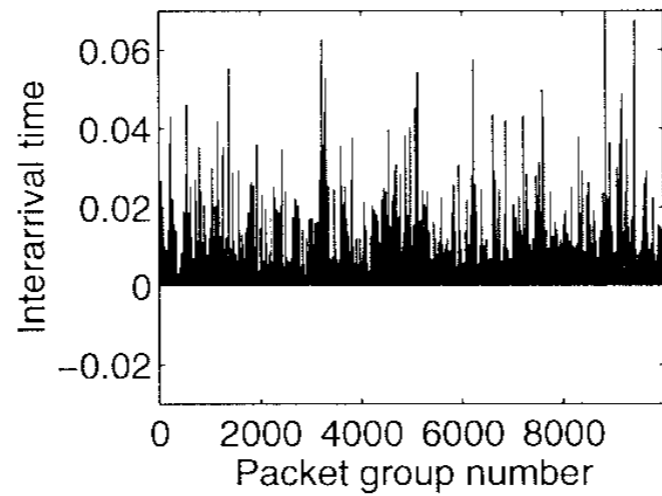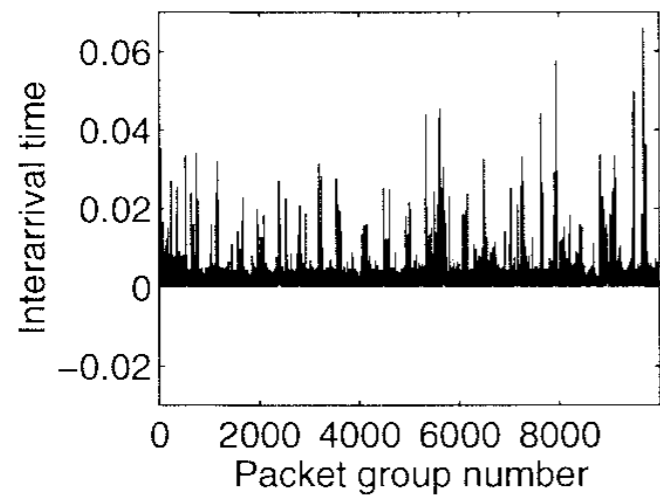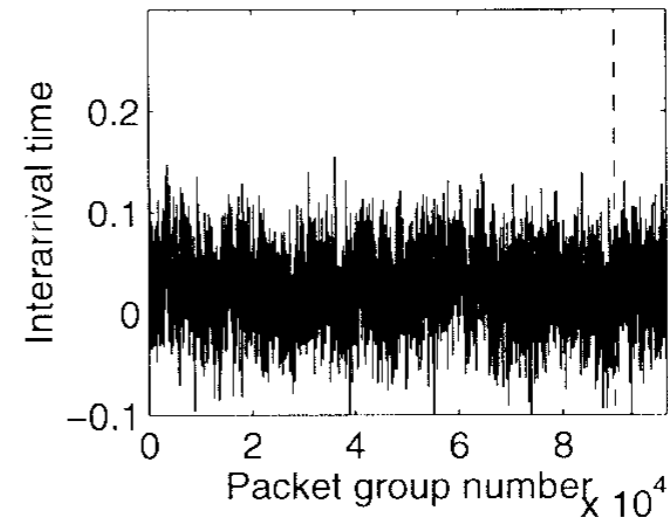
- Real programs
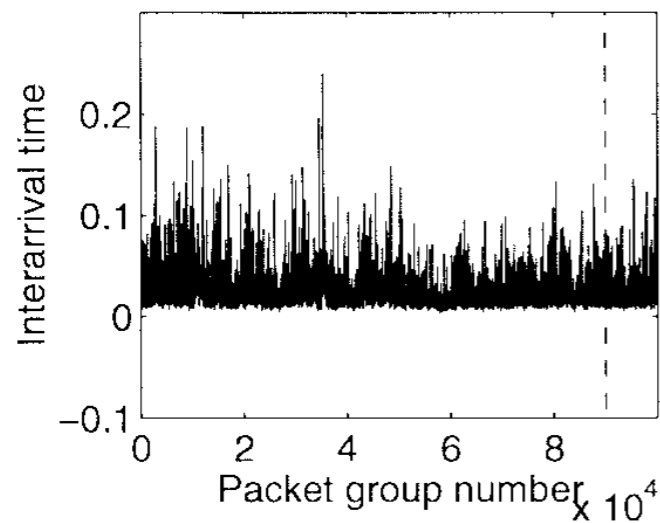
- Record & replay
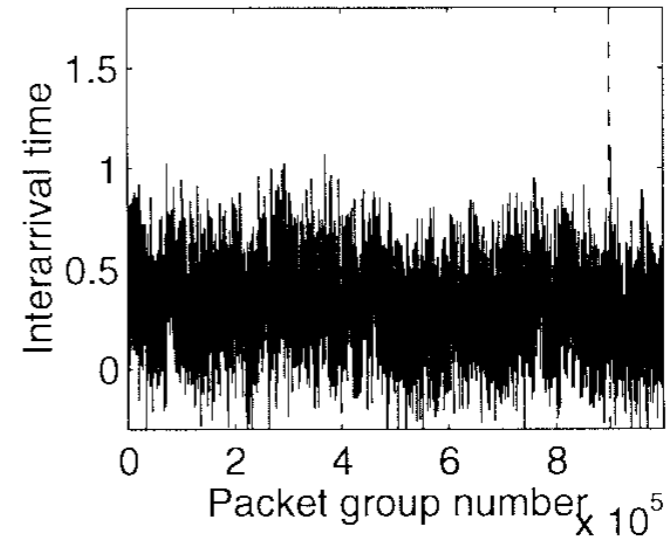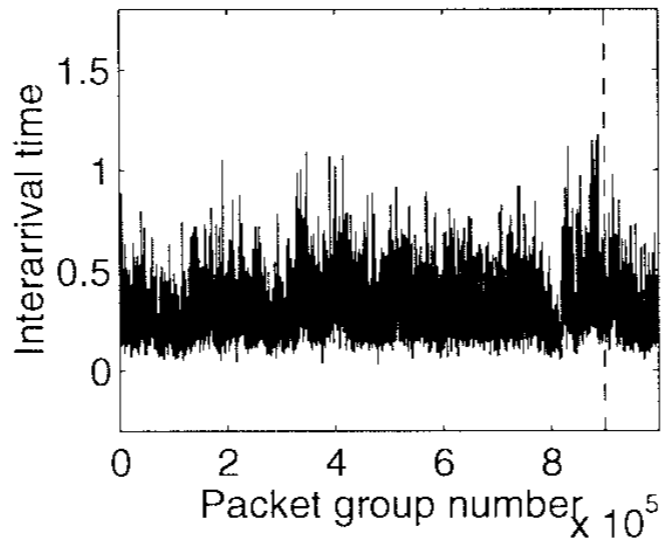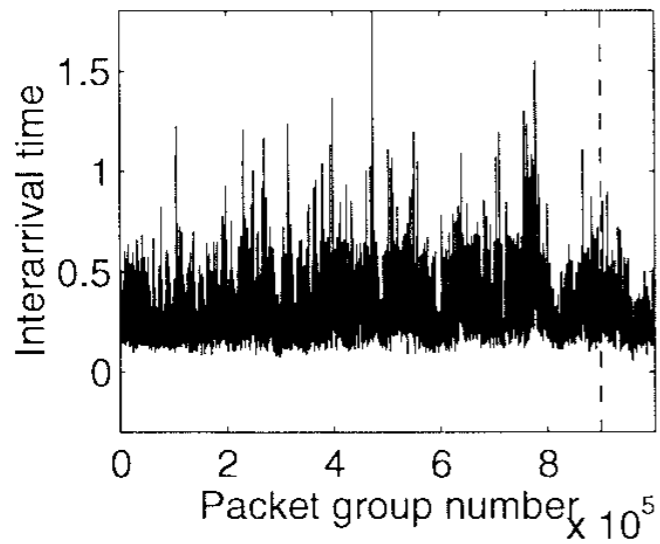
Data Synthesis

1. Traffic
2. Schedule
3. Power
4. Temperature

Traffic

- Burstiness

- Self-similarity

- Long-range dependence

(Leland et al., 1994)

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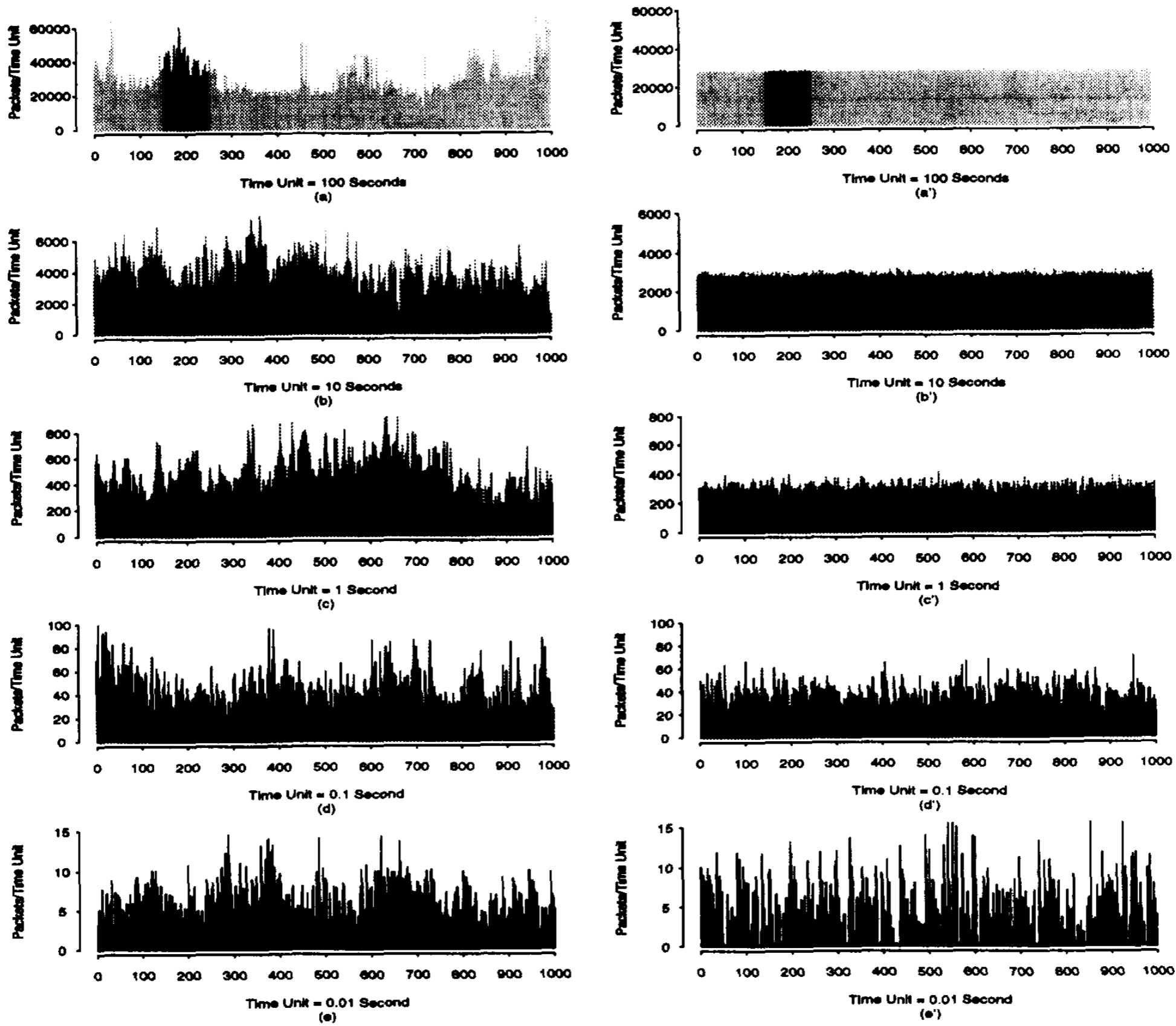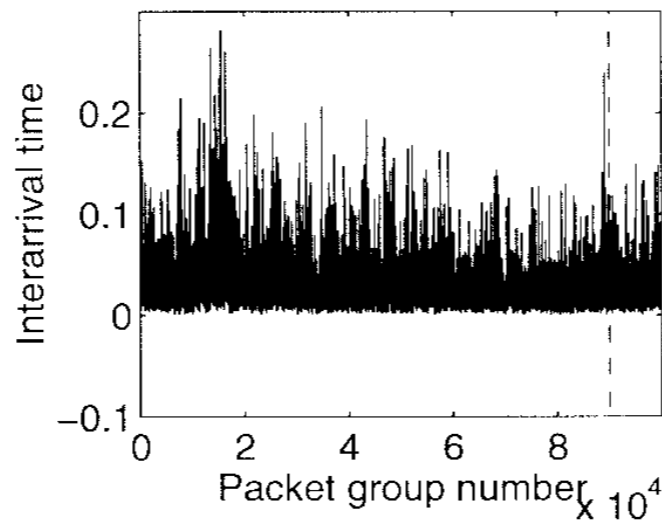
(Riedi et al., 1999)

Schedule

- Given

- Swappable

Power

- Compose
- No simulation

Temperature

- Compute

Data Synthesis

1. Traffic

2. Schedule

3. Power

4. Temperature

Toolchain

- Up and running

Conclusion

- Synthetic data for fun and profit

Thank you!
Questions?