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

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Power & Temperature

- 42
- Fundamental

Multiprocessors

- Complex
- Uncertain

Uncertainty

- Aging
- Workload
- Process variation

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

Reference Arrivals

- Logging & monitoring

Reference Workloads

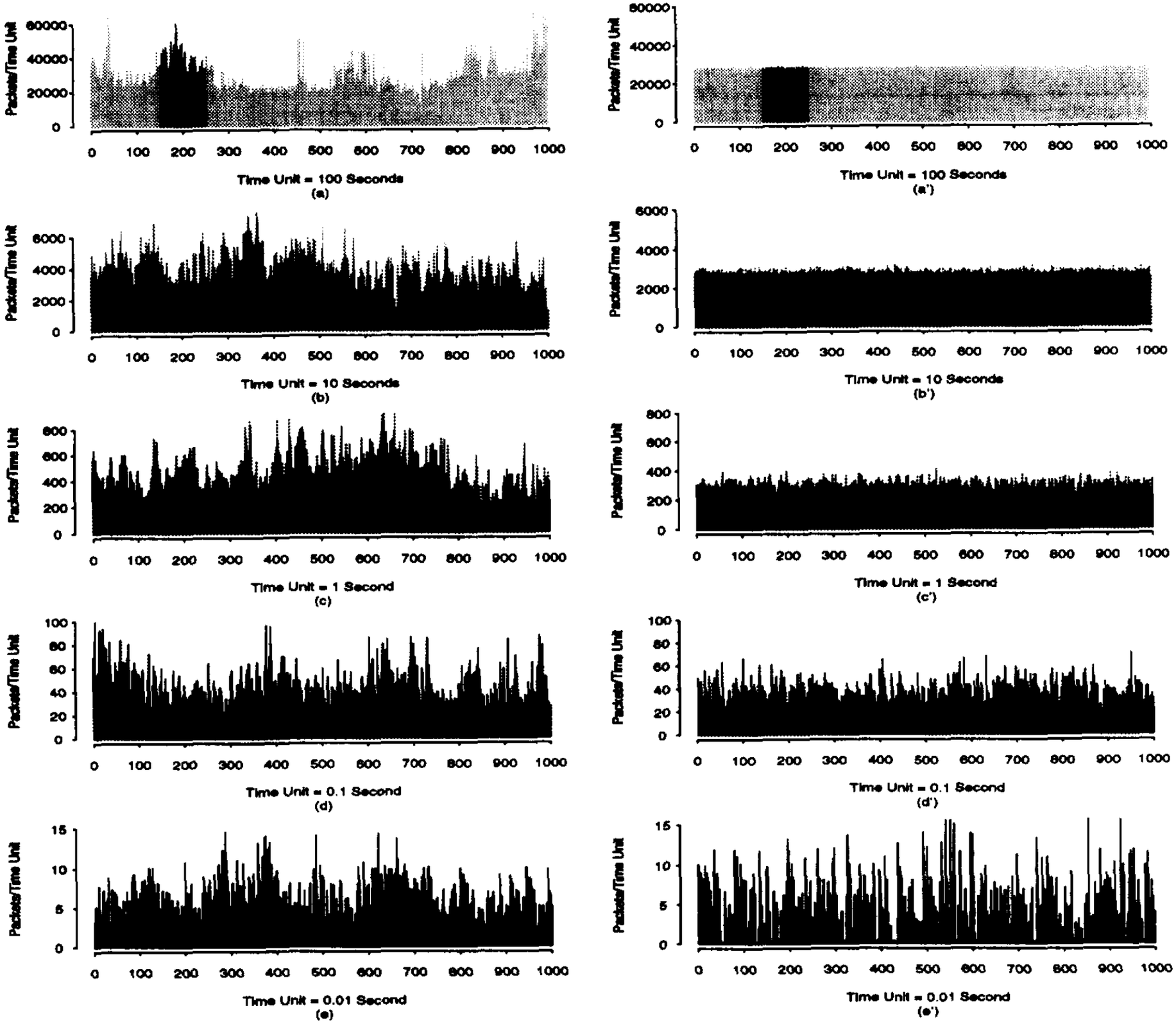
- Real programs
- Record & replay

Data Synthesis

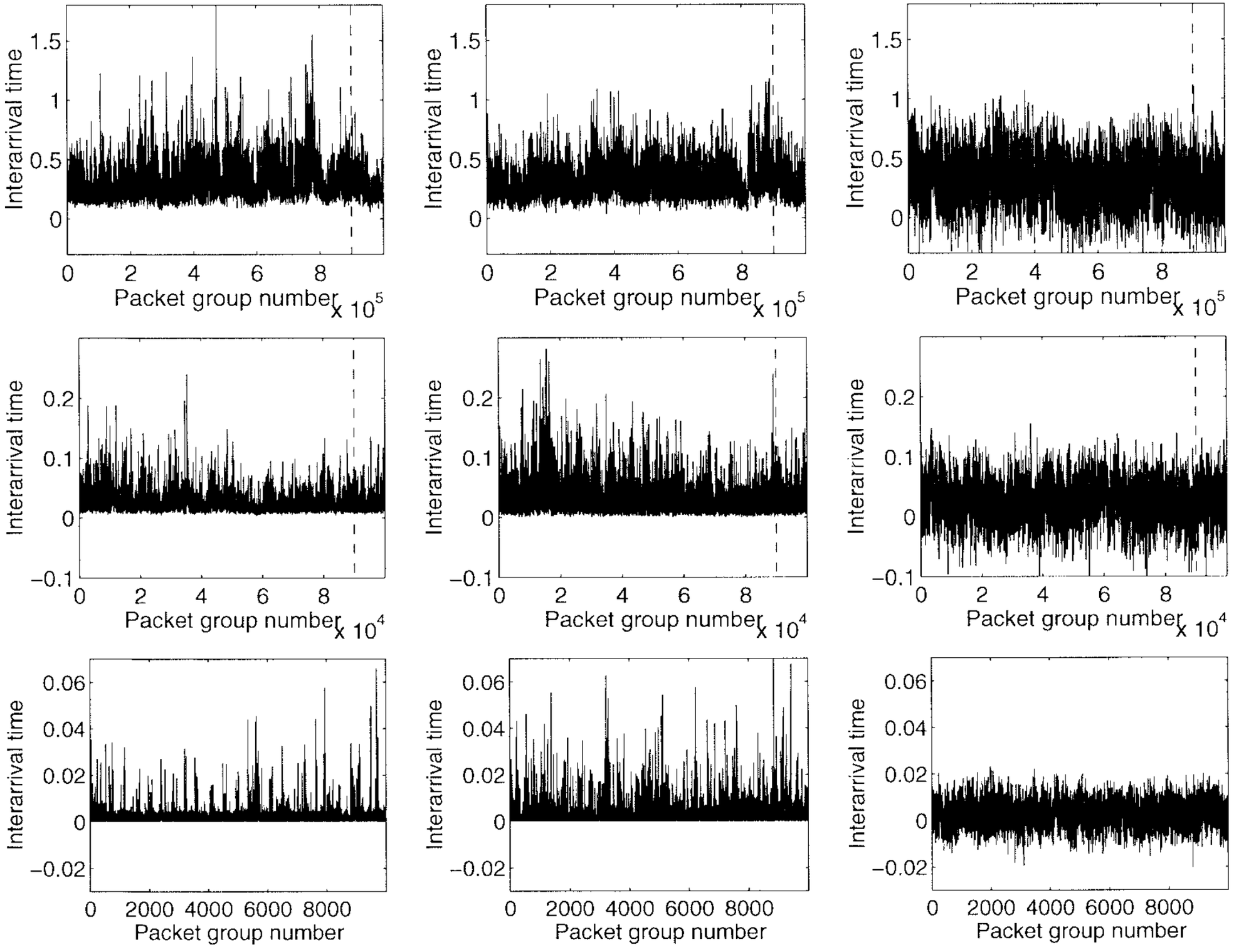
1. Traffic
2. Schedule
3. Power
4. Temperature

Traffic

- Burstiness
- Self-similarity
- Long-range dependence



(Leland et al., 1994)



(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?