TPC Transaction Processing Performance Council

The TPC defines transaction processing and database benchmarks and delivers trusted results to the industry.

TPC-Energy Benchmark Development:

Mike Nikolaiev, Chairman of the TPC-Energy Specification Committee

TPC-Energy Specification

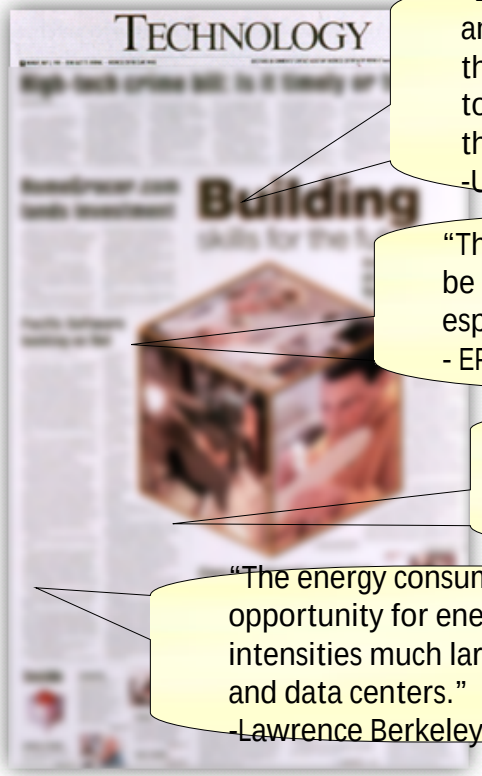
- TPC's Energy Specification subcommittee was formed in December 2007, and the following slides illustrate the organization's work-to-date and current direction
- This information is not intended to represent the final benchmark
  - As benchmark development matures, further prototype and analysis work may alter the TPC's direction

Energy Spec: Meeting industry demand

- In the past, performance and price/performance were the key criteria in data center purchasing decisions
- Energy efficiency has become another significant factor in evaluating computing hardware
  - To date, the TPC has developed nine distinct benchmarks, each according to industry demand
  - The Energy Specification is a continuation of the TPC's work over the past two decades
- The Energy Specification will supplement the TPC's existing benchmarks
  - It will not be a stand-alone benchmark

Energy Spec: Calls for standardized metrics

- Energy efficiency in the data center has become one of the top concerns for IT managers



"Data centers perform computing functions vital to the U.S. economy, yet they require large amounts of energy to operate. To support the growing demand for processing power throughout the nation, data centers are using ever more compact and energy-intensive servers—even as the total number and size of data centers continues to increase. This is creating a serious burden on the U.S. electric grid."
-U.S. Department of Energy, April 2009

"The EPA is working with interested parties to identify ways in which energy efficiency can be measured, documented and implemented in data centers and the equipment they house, especially servers."
- EPA, 2009

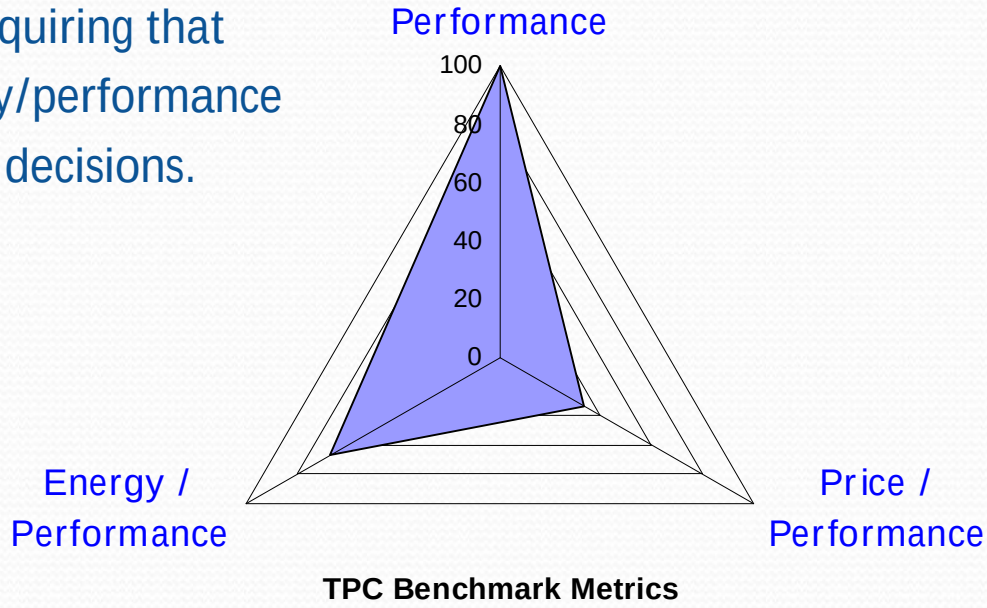
"As the cost of power grows significantly, the application of energy efficiency to systems performance becomes a metric that cannot be ignored."
- IBM, Oct. 2007

"The energy consumed by high-tech industries and institutions represents an attractive and often untapped opportunity for energy savings. Characterized by large base-loads operating 24 hours a day with energy intensities much larger than typical commercial buildings, high-tech buildings include laboratories, cleanrooms, and data centers."
-Lawrence Berkeley National Laboratory, 2009

- Metrics that measure the application of energy efficiency against systems price and performance are needed

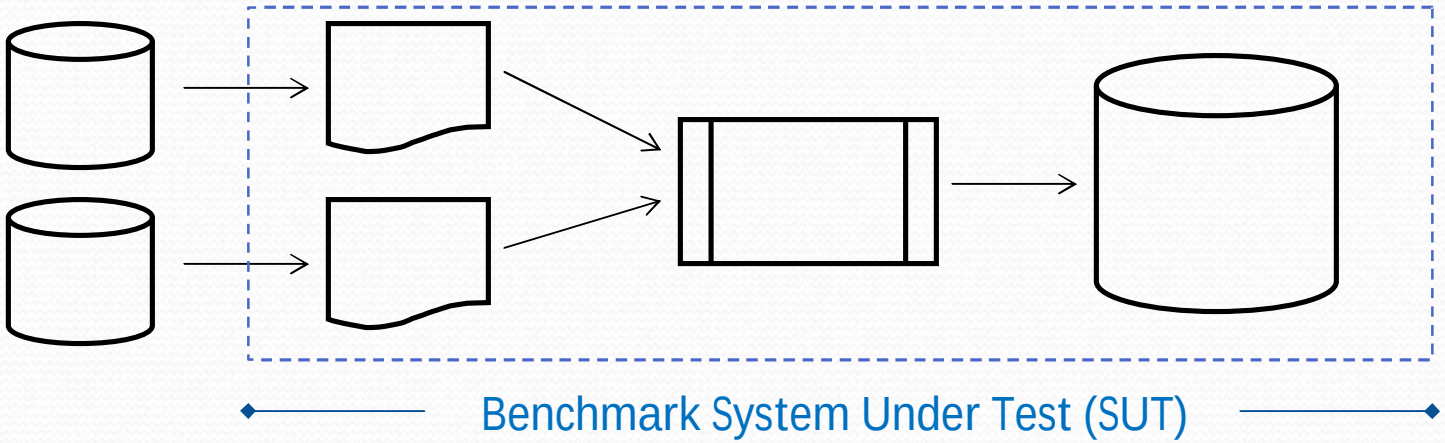
Price, performance and power consumption

- The three most important criteria in IT purchases include:
  - Performance
  - Price
  - Energy consumption
- Today's complex IT environment demands that price and energy be put in perspective of the performance.
- Customers are increasingly requiring that price/performance and energy/performance be provided for IT purchasing decisions.



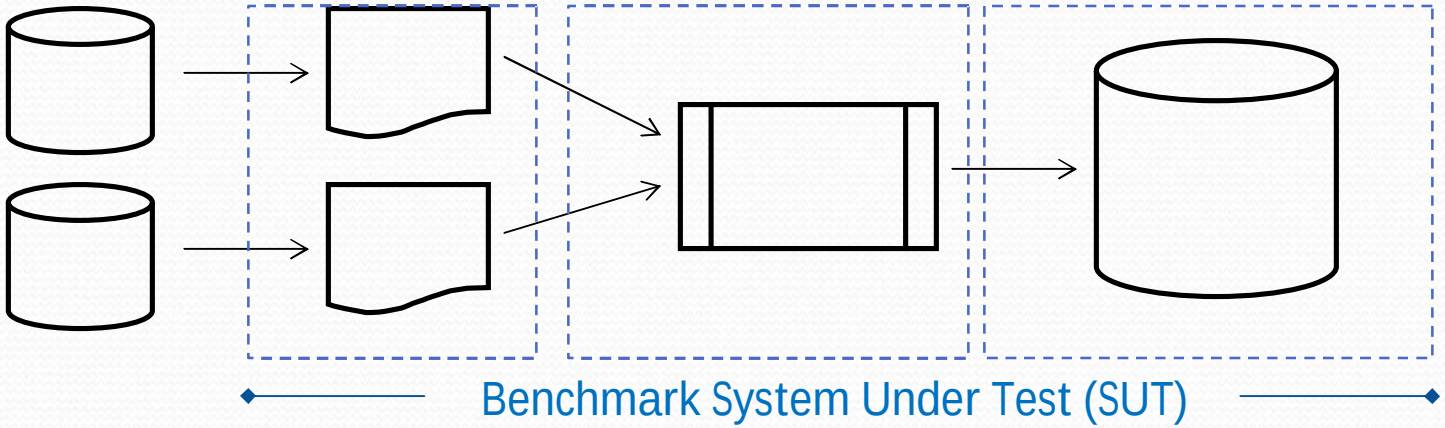
TPC Benchmark Metrics

Energy and SUT



- A System Under Test (SUT) should be similar to a typical customer installation rather than highly tuned and customized to run a specific benchmark
- The TPC Energy Spec helps manufacturers provide energy usage measurements, which mirror what an average user of a given system will experience
- The metric requires components of the SUT to be commercially available
- The physical environment in which the test is conducted must also be comparable to a typical business setting including:
  - Temperature, humidity, and altitude

Energy and SUT



- The Energy Primary Metric is of the form ENERGY Consumption / Performance (TPC-E example: 32 watts/tpsE)
- Subsystems definitions and reporting of energy metrics is also allowed
  - Server(s)
  - Storage
  - Application Server(s)
  - Miscellaneous
- The sum of the subsystems metrics is equal to the Primary Metric (for the entire System under Test)
- Fair-use rules for appropriate subsystem comparisons

Energy Measurement System (EMS)

- The EMS is an online software package designed to help manufacturers reduce the cost and difficulty of implementing the TPC Energy Specification
- The EMS will provide services like power instrumentation interfacing, power and temperature logging, report generation and more
- The EMS will be accessible via the TPC's Web site
- The source code for all modules except Power Temperature Daemon (licensed from the Standard Performance Evaluation Corporation) is available for download.

Energy Spec: Summary

- The TPC's Energy Specification is a continuation of ongoing efforts to meet the needs of a rapidly changing industry
- Customers will be able to go to the TPC Web site to identify systems that meet their price, performance and energy requirements
- Systems that use less energy also have reduced cooling requirements
- Energy Metrics reporting is optional
  - Continue to allow many TPC benchmarks
  - Allow time for implementers to invest in required infrastructure
  - Competitive demands will encourage vendors to include Energy metrics

Backup

TPC: Providing the Most Credible Benchmarks in the Industry

- TPC is the only organization that provides consistent price-performance scores
- All tests require full documentation of the components and applications under test, so that the test can be replicated
- The TPC requires an independent audit of results prior to publication
- TPC tests the whole system performance, not just one piece
- TPC is database-agnostic: Oracle, IBM DB2, Sybase, Microsoft SQL Server, MySQL, ParAccel, Exasol and others
- TPC provides cross-platform performance comparisons, a view of processor vs. real performance, technology comparisons and actual cost of performance comparisons

The TPC Today

- Volume of published TPC results continues to rise
- 25 Full Members companies

- 3 Associate Member companies