TPC Express – Reinventing the TPC

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Presented by:
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Agenda – TPC Express: Reinventing the TPC

- Overview and Need
- TPC-Express vs. Enterprise-Class Benchmarks
- TPC-Express Targets
- Benchmark Life Cycle
- A First Project
- Invitation to Participate
TPC-Express: Overview and Need

• “Is There a Kit Available for this Benchmark?”
  • Most commonly asked question of the TPC Administrator
  • Today, the answer must be “no”
    • (...followed by some guidance for who to talk to for help)
TPC-Express: Overview and Need

• TPC Reputation for Strong DB Benchmarks
  • Over 6 dozen of the papers selected for the VLDB2012 International conference used a TPC benchmark as a reference
  • However, official publishes of TPC benchmark results have dwindled
    • Even at its peak, the total official publishes was only slightly higher than the academic papers using unofficial versions
TPC-Express: Overview and Need

- **Contrast: Systems Performance Evaluation Corporation**
  - Not all SPEC benchmarks are wildly successful
  - SPEC’s most popular benchmarks have seen substantial use in the industry:
    - Consider SPEC’s 3 most popular benchmarks

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Publishes in last 2 active quarters</th>
<th>Lifetime publishes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECpower_ssj2008</td>
<td>19</td>
<td>440</td>
</tr>
<tr>
<td>SPECjbb2005</td>
<td>39</td>
<td>746</td>
</tr>
<tr>
<td>SPECcpu suite</td>
<td>729</td>
<td>4391</td>
</tr>
</tbody>
</table>
TPC-Express: Overview and Need

• What makes a popular benchmark - - - popular?

1. Easy order/delivery/execution/validation process
   • Benchmark does not require massive personnel investment

2. Meaningful subset of compute industry function
   • Important stuff tested

3. Economical test environment
   • Can be run on almost any configuration

4. Useful for academic research
   • Result of above 3

5. Strong base of existing results
   • Result of above 4
TPC Express – Overview and Need

- **Who Publishes/Uses TPC Benchmarks?**
  - Computer HW and SW manufacturers
    - The TPC Membership, generally
    - Some publications
    - Much internal engineering work
  - Academia
    - Dozens of the papers selected for VLDB conferences reference TPC benchmark
    - *None* of them were able to use an official TPC Benchmark Result
  - Consumers
    - Many consumers require TPC-related projections in their RFPs
    - *No* consumers actually exercise TPC benchmarks
  - Analysts
    - Prepare results under contract or as a part of an analysis project
    - *Almost never* publish official results

Need a solution to strengthen the first group, and make TPC benchmarks more readily available for the others.
TPC-Express vs. Enterprise-Class Benchmarks

• Existing TPC Benchmark Model:
  • Enterprise Database Applications
    • Business Case Model
      • Inputs and Outputs defined
      • Implementation left to the implementer
    • Full System Configurations
      • Enterprise database applications access a lot of data
  • Absolutely valid model
    • Allows implementation on wide variety of products
  • But
    • Expensive to get started
    • Expensive to implement
TPC-Express vs. Enterprise-Class Benchmarks

• Proposal and Challenge:

• Create a benchmark model that retains the strengths of the Enterprise model, while enveloping the basic requirements for a “popular” benchmark.
• Named “TPC Express”
**TPC-Express vs. Enterprise-Class Benchmarks (1/2)**

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Express</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification Based with some TPC code</td>
<td>Kit based enhanced by specification</td>
</tr>
<tr>
<td>RYO implementation</td>
<td>OOB implementation</td>
</tr>
<tr>
<td>Price required</td>
<td>Price eliminated</td>
</tr>
<tr>
<td>ACID</td>
<td>ACI testing</td>
</tr>
<tr>
<td>Full system configuration</td>
<td>Limited configuration focused on key benchmark requirements</td>
</tr>
<tr>
<td>Substantial implementation costs</td>
<td>Reduced implementation costs</td>
</tr>
</tbody>
</table>
## TPC-Express vs. Enterprise-Class Benchmarks (2/2)

<table>
<thead>
<tr>
<th><strong>Enterprise</strong></th>
<th><strong>Express</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly tuned – best possible optimization allowed</td>
<td>System and DBMS tuning, but not application or kit</td>
</tr>
<tr>
<td>Full Audit</td>
<td>Much self validation</td>
</tr>
<tr>
<td>Any product allowed</td>
<td>Some pre-qualification of products required (no audit)</td>
</tr>
<tr>
<td>TPC revenues from benchmark registration</td>
<td>TPC revenues from license sales and benchmark registration</td>
</tr>
<tr>
<td>Ability to promote results on Sponsor’s schedule</td>
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</table>

**Target:** Increased use and publication of official TPC Benchmarks.
Each part of the process must be examined.

**Release** is a substantial change - - Executable kit instead of paper specification.

**Register** and **Download** involve a licensing process.
Additional Support from the TPC is needed for a licensed product.

Build and Run are “kit-tested”, but still require analysis.
TPC-Express Benchmark Life Cycle – Target “Ease Of...”

Post Processing replaces a 3rd party audit with self-validation; much included in the kit.

Submission, Validation, Review likely to be similar to Enterprise model.
TPC-Express Target Cost to Implement

Recent TPC-C publish on 2-socket server.

List Price of HW: Approximately $600,000

Dominant Costs: Storage, Memory

Recent TPC-E publish on 2-socket server.

List Price of HW: Approximately $120,000
Target TPC Express
Configuration for 2 socket server:

- Server
- 2 mirrored SSDs for Logs
- 2 mirrored HDDs for DB
- 256-512GB memory
- ‘Nothing’ else.

Approximate list price of HW:
$20-25,000

Still too high? Perhaps. The typical server is sold with 32-128GB of memory.

TPC is examining whether appropriate stress of DBMS can be done with less memory in a benchmark environment.
TPC-Express - - A First Implementation

• Much infrastructure to adjust, enhance, or invent
• First benchmark needs to be a known environment
• Member company donating key parts of their kit for TPC-E
• Major adjustments to the kit to
  • Create a unique benchmark
  • Greatly reduce scope of system under test
  • Build compatibility with multiple DBs
  • Package the kit for general distribution
TPC-Express - A First Implementation

• New benchmark is NOT intended to replace TPC-E
  • Enterprise and Express models compliment each other
• Not comparable to TPC-E for a variety of reasons
  • Substantially different DB access pattern
  • Almost no use of Storage Management functions
  • Different level of optimization allowed
  • Different level of functional compliance checking required
TPC-Express - A First Implementation

• What you can expect:
  • Focus on all three of the key “popularity” criteria
  • Licensed product from the TPC
    • Including a nominal license fee, not unlike other benchmark organizations
  • Tested to work with specific DB and OS products that have worked with the TPC to prove compliance
    • Some (tbd) method for accepting new DB and/or OS products as supported by the kit
  • When you can expect it?
TPC-Express Targets

• Target Audience for TPC-Express:
  • Computer Manufacturers
    • Complements, does not replace Enterprise model
    • Less expensive, more rapid implementation
    • Relief of pricing and durability requirements allow publication in broader range of environments – including Cloud
  • Research – Academia
    • Already use TPC one-offs
    • TPC Express allows use of an official TPC benchmark without being encumbered by durability testing, huge configurations, audit, price
  • Analysts
    • Ability to use full TPC benchmarks for research and for contracts with manufacturers and customers
  • Actual customers
    • Potential to use Express benchmarks as an internal validation tool to ensure system updates are working as expected
TPC-Express Summary and Invitation to Participate

- TPC is responding to the needs of prospective benchmark analysts with the TPC-Express model.
- Targeting essential features of a successful benchmark:
  - Pre-developed kit
  - Important tested features
  - Economical configurations and measurement processes
- First example will be based off existing TPC benchmark:
  - Allows TPC to build necessary infrastructure to support the new benchmark model.
TPC-Express Summary and Invitation to Participate

• TPC Express model is extensible to a wide range of benchmarks
  • Existing TPC environments
  • New environments waiting for an industry standard measure
• TPC invites participation in this exciting shift
  • Express model better suited to environments such as Cloud, Big Data, hybrid storage/memory, DB appliances, etc.
  • Express model better suited to academic and research communities
• TPC membership is open
  • Best opportunity to help create new industry standards
  • Anticipate free licenses for TPC members
Q&A