EnterpriseDB®
The Enterprise PostgreSQL Company

An Overview of PostgreSQL 9.2

Robert Haas
Senior Database Architect

PostgreSQL 9.2: Opening New Horizons

- **High-End Servers**
- **Larger Data Sets**
- **More Copies of PostgreSQL**
- **More Replicas**

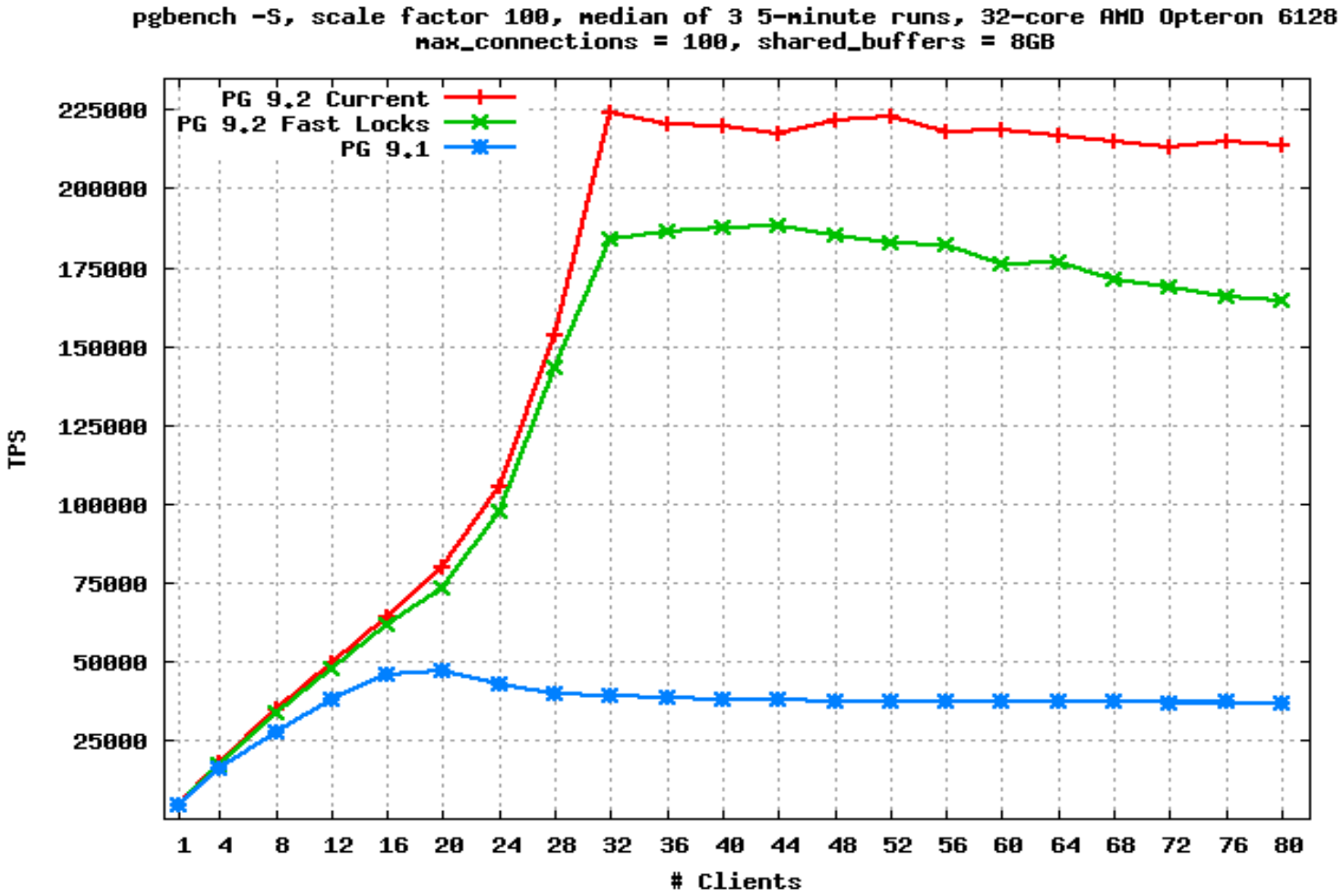
Major PostgreSQL 9.2 Features

- **Scalability (for servers with many CPUs)**
- **Index-Only Scans (for larger data sets)**
- **Reduced Power Consumption (for hosting providers)**
- **New Backup and Replication Options (for scale-out)**

Scalability

- **Scalability: The ability to effectively leverage a larger quantity of computing resources to get more work done.**
- **More CPUs = more transactions per second.**
- **In PostgreSQL 9.1, scalability can be severely limited by lock contention even on systems with 8 cores or less.**
- **In PostgreSQL 9.2, many (but not all) of these workloads scale linearly up 32 cores.**

Read Scalability (as of September 2011)



Scalability Improvements

- **“Fast path” locking. Virtual transaction ID locks and “weak” relation locks rarely conflict, so we allow them to bypass the main lock manager.**
- **Shorten critical section for snapshot acquisition. Moving frequently accessed data to a separate array reduces cache line passing.**
- **Better scalability around write-ahead log flush. Reduced lock contention when many backends are simultaneously attempting to flush WAL; improves group commit performance.**
- **Parallel write-ahead insertion. Multiple backends can copy data into the WAL stream simultaneously.**
- **More…**

Index-Only Scans

- **In PostgreSQL 9.1 and prior, every index access requires a table access as well, to determine whether the tuple is visible to the current transaction's MVCC snapshot.**
- **In PostgreSQL 9.2, if all the necessary columns are present in the index, and the page is known to be "all visible", we can skip the table access.**
- **To make this possible, the "visibility map", which has existed since PostgreSQL 8.4, had to be made safe against database crashes.**

Reduced Power Consumption

- **In PostgreSQL 9.1, there are approximately 11.5 auxilliary process wake-ups per second.**
- **In PostgreSQL 9.2devel, as of 2012-02-03, there are approximately 7.5 auxiliary process wakeups per second.**
- **For hosting providers with many virtualized, lightly-used copies of PostgreSQL, fewer wake-ups translates into real cost savings.**

New Backup and Replication Options

- **Cascading Replication**
- **Base Backup from Standby (via pg_basebackup)**
- **pg_receivexlog**
- **New Synchronous Replication Mode: Remote Write**

Many Other Improvements

- **JSON**
- **Range Types**
- **Parameterized Paths**
- **Faster Sorting**
- **Security Barrier Views**
- **Rewrite-Free ALTER TABLE .. ALTER TYPE**

What's Next?

- **Buffer replacement is mostly single-threaded.**
- **Full page writes cause severe throughput degradation following a checkpoint.**
- **Checkpoints can cause I/O-related stalls.**
- **Some locks are still heavily contended, especially on systems with >32 cores.**

Questions

- **Any Questions?**