PostgreSQL Introduction

History

- First version was released in 1997
- Initiated as Ingres project at UC Berkeley (Michael Stonebraker)
- Written in C
- Flexible across all the UNIX platforms , Windows, MacOS and others
- Standard Postgres Sources and Knowledge base
  - www.postgresql.org – (documentation, release notes and community)
  - PostgreSQL Wiki page

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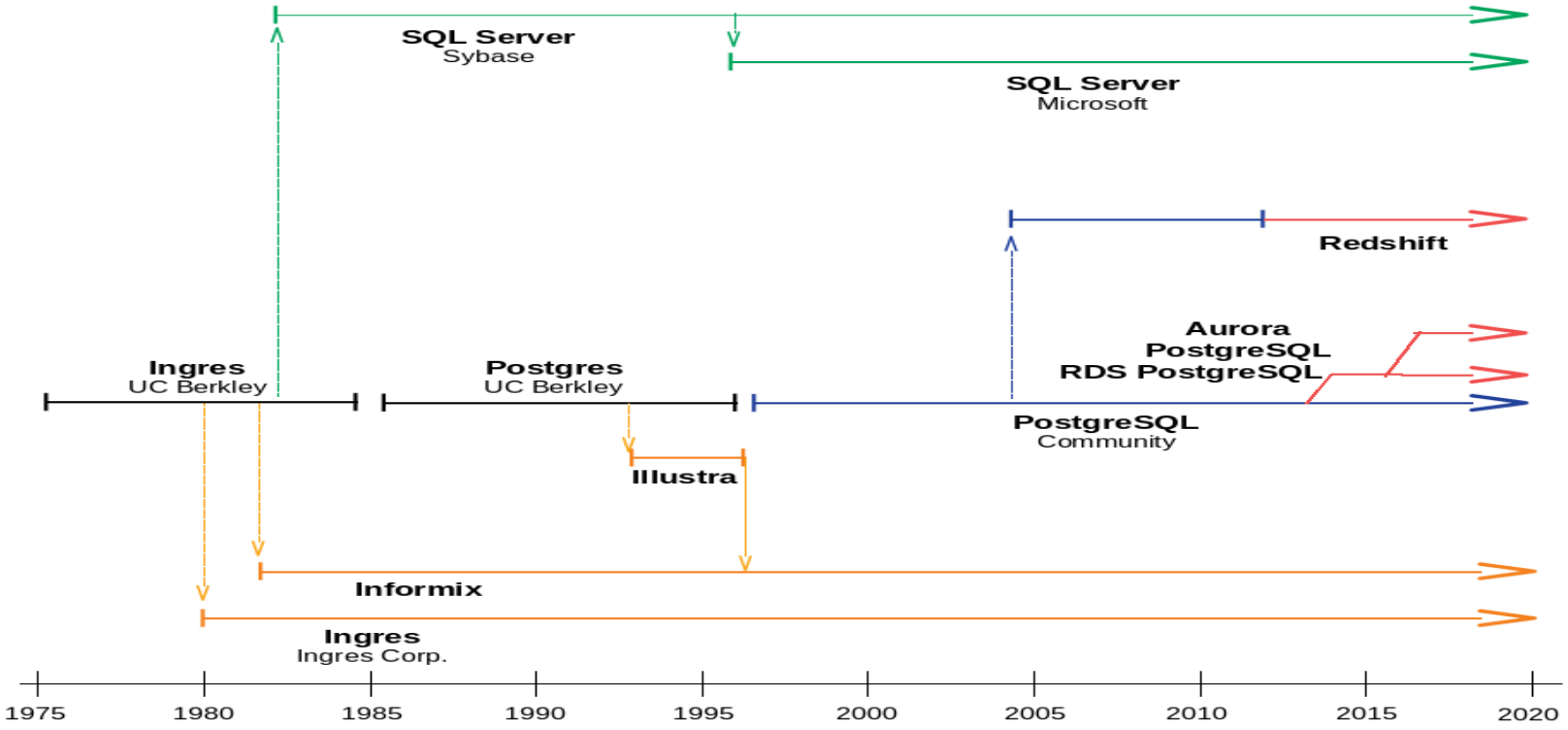
PostgreSQL Lineage



Database 101 - Transactions

- A transaction is a unit of work
- It’s all or nothing
  - A Beginning (BEGIN;)
  - Work (INSERTs / UPDATEs / DELETEs / SELECTs)
  - An Ending (END;) You would expect one of two cases
    - COMMIT; (save everything)
    - ROLLBACK; (undo all changes, save nothing)

Once the transaction has ended, it will either make ALL of the changes between BEGIN; and COMMIT; or NONE of them

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Database 101 - Isolation

- Dirty read
  - A transaction reads data written by a concurrent uncommitted transaction.
- Nonrepeatable read
  - A transaction re-reads data it has previously read and finds that data has been modified by another transaction that committed since the original read
- Phantom read
  - A transaction re-executes a query that satisfies a search condition and gets different set of rows.
- Serializable anomaly
  - The result of committing a group of transactions is inconsistent with running them one at a time

PostgreSQL 101

- PostgreSQL meets all of the requirements to be a fully ACID-compliant, transactional database.
- In order to accomplish this, there are many concepts taken from general database / computer science and implemented
- The focus of this course will be to show how PostgreSQL accomplishes this internally and the effects that those internals have on end-user functionality
- PostgreSQL RDBMS serves an ‘instance’.
  - An instance serves one (and only one) TCP/IP port
  - Has a dedicated data-directory
  - Contains at least one database

Features

- Full network client-server architecture
- ACID compliant
- Transactional (uses WAL / REDO)
- Partitioning
- Tiered storage via tablespaces
- Multiversion Concurrency Control (readers don’t block writers)
- On-line maintenance operations
- Hot (readonly) and Warm (quick-promote) standby
- Log-based and trigger based replication
- SSL
- Full-text search
- Procedural languages

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Database Limitations

Limit	Value
Maximum Database Size	64 ZB
Maximum Table Size	32 TB
Maximum Row Size	1.6 TB
Maximum Field Size	1 GB
Maximum Rows / Table	Unlimited
Maximum Columns / Table	250-1600
Maximum Indexes / Table	Unlimited

General Database Limitations

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PostgreSQL Terminology

- PostgreSQL was designed in academia
  - Objects are defined in academic terms
  - Terminology based on relational calculus / algebra

Industry Term	Postgres Term
Table or Index	Relation
Row	Tuple
Column	Attribute
Data Block	Page (when block is on disk)
Page	Buffer (when block is in memory)