OLTP
Implementation is characterized by keeping transactions ACID. These operations such as Insert, Update, Delete are optimized for ACID properties. ACID stands for atomic, consistent, Isolated, durable. B-tree indexes. Views are virtual in OLTP databases.
OLAP
Implementation is characterized by ad-hoc queries which are more complex and do well with aggregation. Bit-map indexes are used in OLAP. Views are materialized.
Challenges for stream processing are volume, velocity, and variety. volume and velocity essentially require that a system has to be distributed. This is an obsticle in relational DBMS systems becuase relational DBMS systems are complicated if distribted. Relational DBMS also have problems with variety of data, as relational databases require that the data be normalized. Non relational databases have a less strict requirement on the structure of the data.
The cap theorem states that a distributed system must balance 3 qualities of consistency, availiablity and partition tolerance. Availability requires a distributed system. Distributed systems will be able to handle constant requests but have to relax constraints from consistent to eventual considtency. Also, there is no longer an absolute requirement that all transactions occur in isolation because there is no need for lock out mechanisms.