# ECON485 Introduction to Database Systems

Lecture 08 – Quality Requirements for Databases

# Quality Requirements

**A quality requirement is a requirement about how a functionality should be, not what it should be.**

Being fast, being secure, being dependable, etc.

For databases we have some very common quality requirements.

**Quality requirements dictate the design of a system. Therefore they form design constraints.**

This is usually the concern of engineers however, anyone involved in database systems should understand these requirements.

Satisfying every design constraint comes at a cost in the production process. This cost is paid partially as a trade-off between other quality requirements and partially as more money.

**We also have the notion of data quality, which is another subject.**

# Quality Requirements

## Integrity

- Caches and cache integrity
- Vertical sharding
- Horizontal sharding

# Quality Requirements

## Availability

- Uptime as an availability metric
- Availability per service offered
- Design for high availability
- Vertical and horizontal sharding
- Erasure coding
- Load balancers

# Quality Requirements

## Scalability

- Increase in requests
- Scalability per service offered
- Scaling up vs scaling down
- Vertical and horizontal sharding
- Load balancers

# Quality Requirements

## Reliability

- Uptime
- MTBF – Mean Time Between Failure
- MTTR – Mean Time To Repair
- Expectation of an error within a given duration.
- Maintenance plans

# Quality Requirements

## Backups and Recovery

- Backup strategies
  - Differential
  - Incremental and Multi-level Incremental
  - Reverse Incremental
  - Synthetic Full Backup
- Backup rotation
- Availability during backup operations
- Time to recovery
- State recovered to
  - Point in time recovery

# Quality Requirements

## Security

- Access towards the database
- Access control models within the database
- Authentication models
- Integration of database security into general model
- Detection of security related problems

# Quality Requirements

## Performance

- Transactions per second/minute
- I/O operations per second/minute
- Active sessions at any time
- Duration of query execution
- Use of locks