# 5. Real world

This is the Real world course theme.

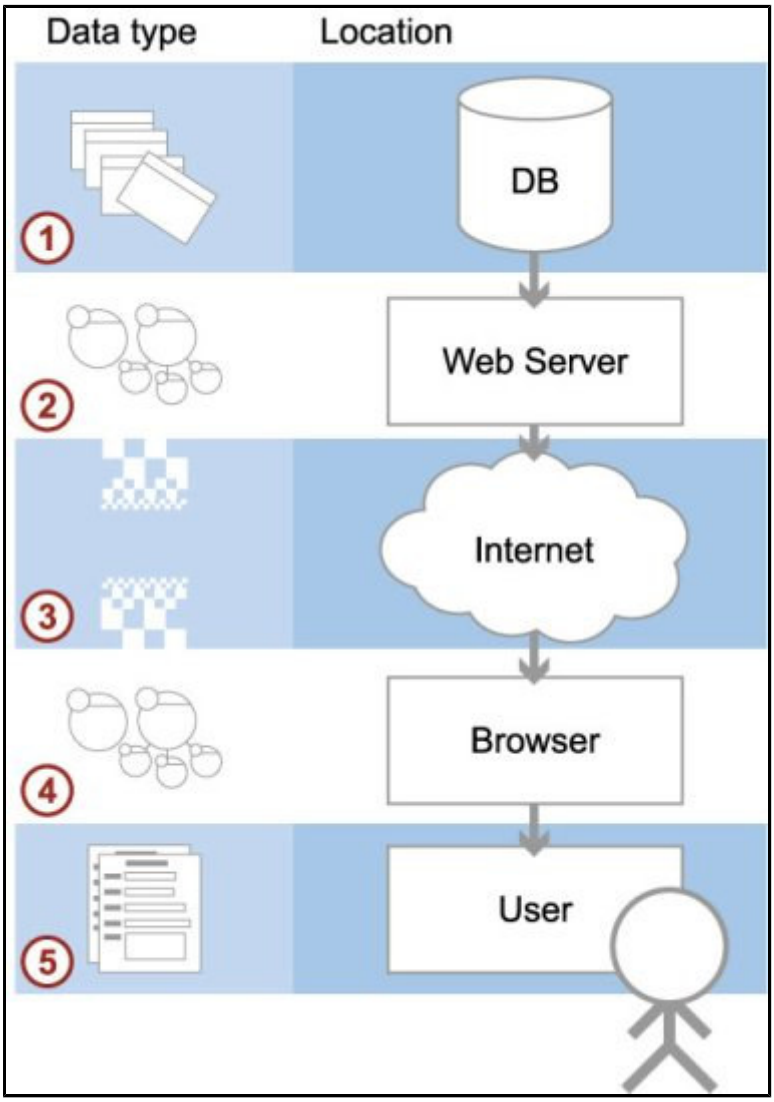
## 5.1. Web

In this lecture we look at...

## 5.1.01. Databases for the Internet

- Path from DB to User
- Information flow
- Data formats (OO)
- Format transitions
- Limitations/channel

  right now
- The Future



# 5.1.02. OO

- Object orientated approach
  - Consistent/optimised development model
  - Good approximation of real world
  - Closer link to mini-world
- Java and PHP
- DB persistence
- UML

# 5.1.03. Java and PHP in context

- Java
  - JSP (server-side)
  - Javascript (client-side)
- PHP
  - Server side only
- JSON or XML
  - Object communication
- Ideal scenario
  - Java – load times

# 5.1.04. In a perfect world

- Homogenous data format/data model
- DB stores objects instead
- Objects transferred
  - Robust
  - Lightweight
  - Fast
  - Consistent (more later in Transactions)
  - Caching

# 5.1.05. In the real world

- Heterogenous data model
- Object translation/wrappers
- Different languages features at different layers
- Minimal subset of OO functionality available end-to-end
- Going to look at information flow/functionality provided

# 5.1.06. User

- Limitations of being human
  - short term memory
  - long term familiarity
- language of the Internet

    - hypertext linking
    - form filling
- Advantages of being human
    - impatience, no waiting
    - wants instant response

# 5.1.07. Browser

- Http requests
- Forms
    - Post
    - Get
- Form fields
    - By name, by ID
    - Hidden
- Javascript/DOM tree

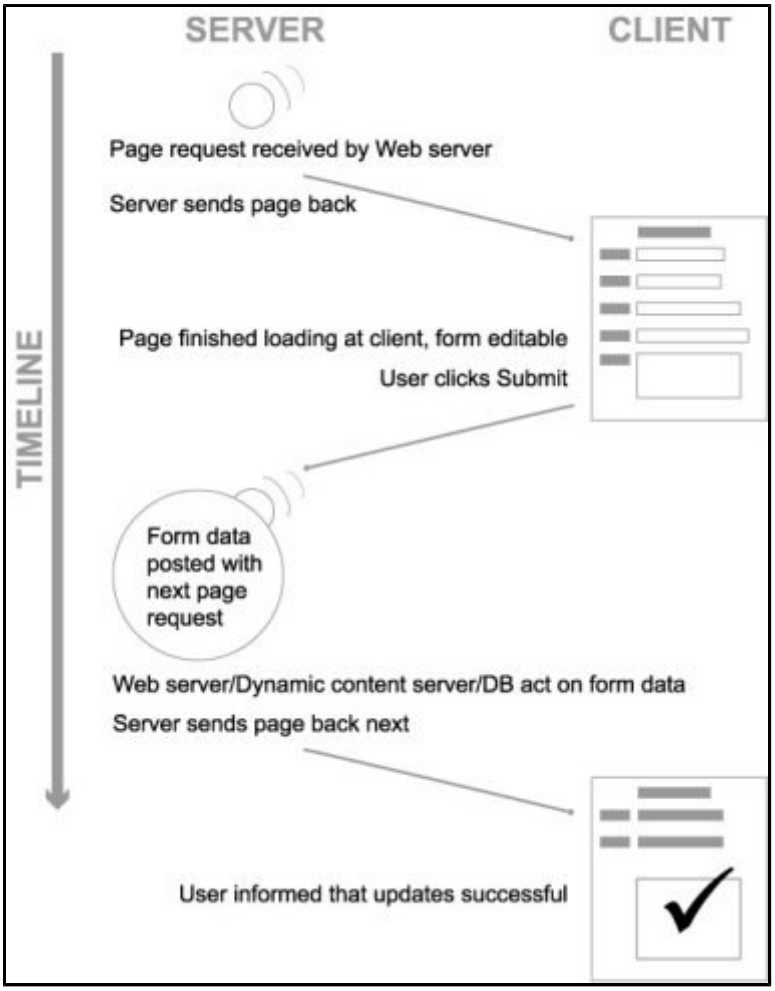
# 5.1.08. Internet

- Communication medium
- Good for transferring data
- Not good for transforming data
- e.g. Light in air
- e.g. Signal over CAT5e/UTP cable

# 5.1.09. Web server

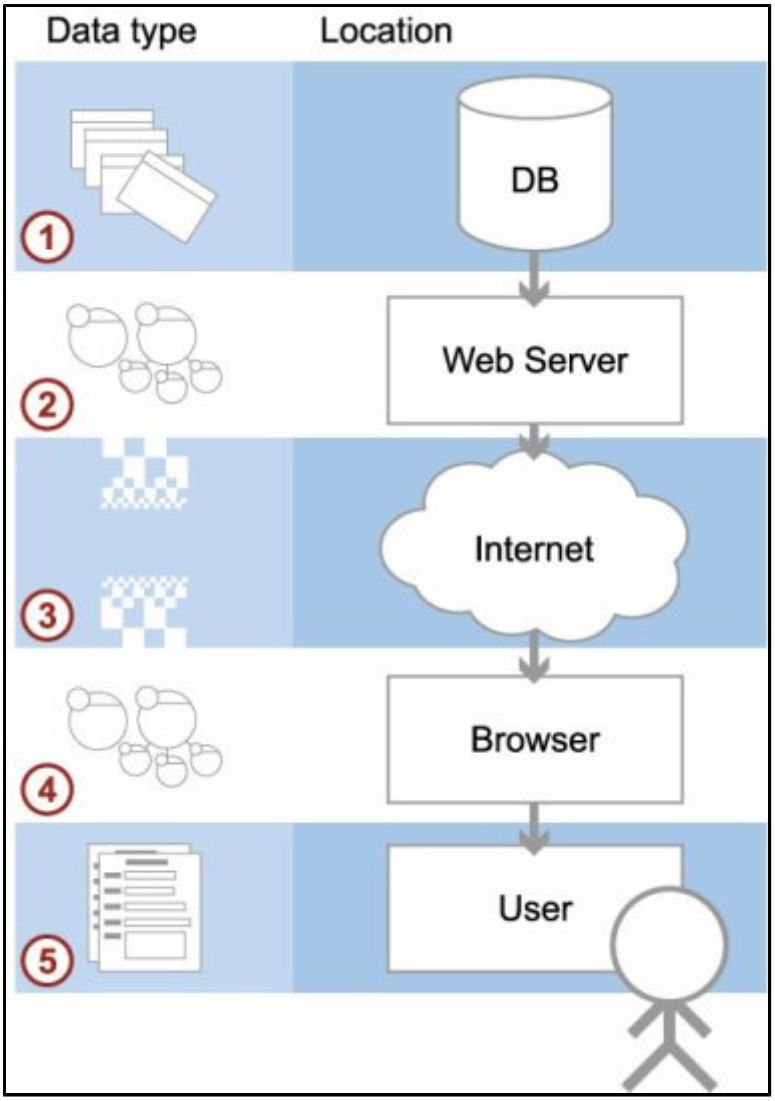
- Straight HTML pages
- Dynamic HTML pages
    - PHP example
    - JSP example
- As above with RDBMS integration
    - PHP PDO example
- As above with Objects
    - PHP DBDO example

# 5.1.10. load, edit, submit, act timeline




# 5.1.11. href click, versus form post

- Protocol stack
- Basic up-down
- Shortcuts
- Browser cache
- Web server
  - assembled page cache
  - php object cache
- DB optimised queries




# 5.1.12. Examples from the web

- Google Maps
  - link
- Car selector and Dealer locator
  - link

# 5.2. Decision Support

In this lecture we look at...

# 5.2.01. Introduction

- Decision support systems (DSS)
- Duplicates of live systems, historical archiving
- Primarily read-only
- Load and refresh operations
- Integrity
  - Assumptions about initial data

- Large, indexed, redundancy

# 5.2.02. DSS Management

- Design
  - Logical
    - Temporal keys, required to distinquish historical data (since:to current & during:within interval)
  - Physical (Hash indexes, Bitmap indexes)
    - Controlled Redundancy
  - Synchronisation/update propogation
    - Synchronous (update driven)
    - Asynchronous (query driven)

# 5.2.03. Data Preparation

- Extract
  - pulling from live database system(s)
- Cleansing
- Transformation and Consolidation
  - migrating from live or legacy system design

    to DSS design
- Load (DSS live/query-able)
- Refresh (latest update)

# 5.2.04. Querying

- Boolean expression complexity
  - heavy WHERE clauses
- Join complexity
  - Normalised databases, many tables
  - Facts distributed across tables
  - Joins required to answer complex questions
- Function and Analytic complexity
  - Often require non-DBMS functions
  - Smaller queries with interleaved code

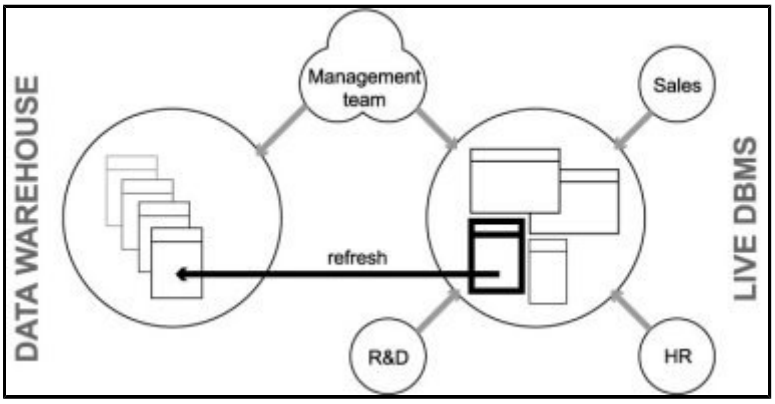
# 5.2.05. Data Warehouse

- Specific example of DSS
- Subject-orientated
  - e.g. customers/products
- Non-volatile
  - once inserted, items cannot be updated
- Time variant

    - Temporal keys
- Accuracy and granularity issues

# 5.2.06. DB Company organisation

- By example



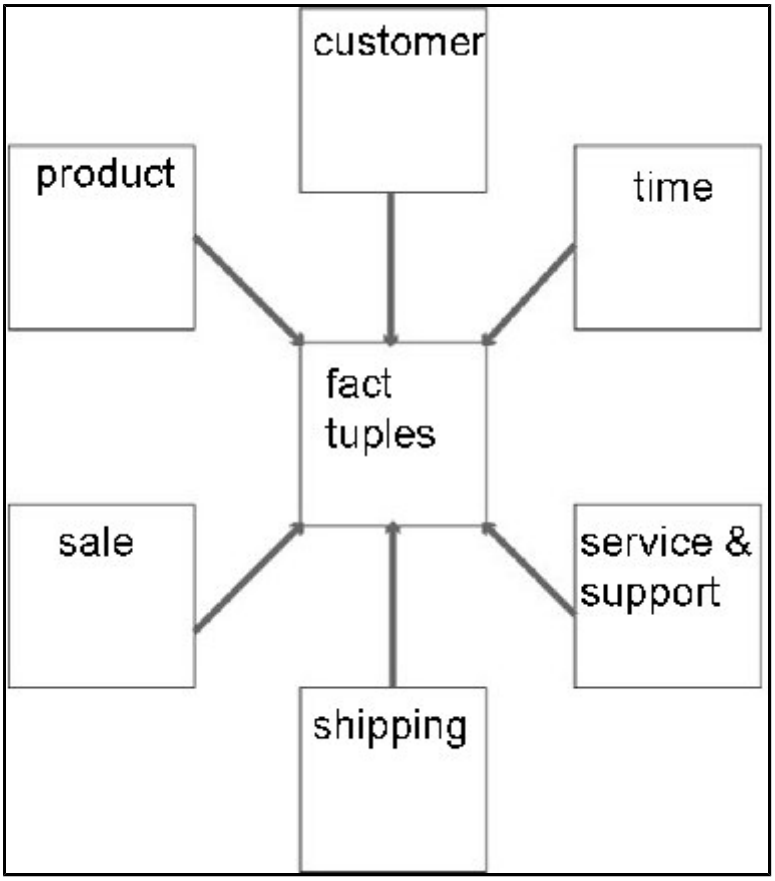

# 5.2.07. Dimensional Schema

- Consider product, customer, sales data
- Each sale represents a specific event
    - when a product was purchased
    - when a customer bought something
    - when a sale was recorded
- Each can be thought of as an axis

  or dimension (3D)
- Each occurred at a moment in time (4D)

# 5.2.08. Star schemae and Hypercubes

- Data centralised in ‘fact’ table
- Referencing creates star pattern
- Dimensions as satellite tables
- Normalising creates snowflake schema




# 5.2.09. Hypercubes

- Hypercube is also a multi-processor topology inspired by a 4D shape
- Used by Intel's iPSC/2
- Good at certain database operations
- e.g. Duplicate removal
- MIMD