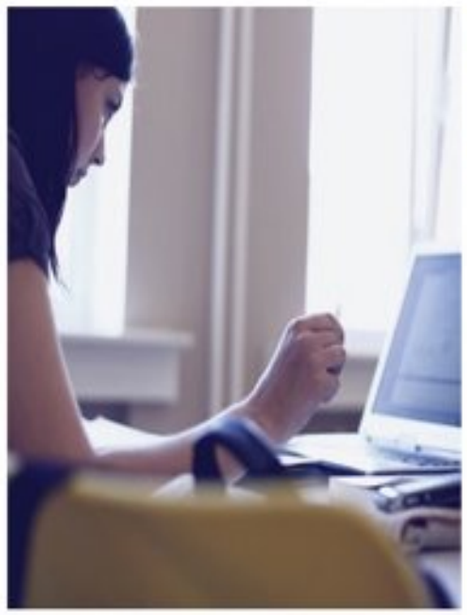
INF700
IT for Business & Management






Estonian Business School

Plan for Today

- Session 1 (1hr, 20 mins)
  - Web Development Group Task
  - Case Study 1 - Moore's Law & e-waste

Coffee break 1 (10 mins)

- Session 2 (1hr, 20 mins)
  - IS Infrastructure Lecture (Main)
  - Big Data Infrastructure

Lunch Break (50 mins)

- Session 3 (1hr, 20 mins)
  - IS Analysis, Design & Implementation

Coffee break 2 (10 mins)

- Session 4 (1hr, 20 mins)
  - Case Study 2 - Tallinn City Council

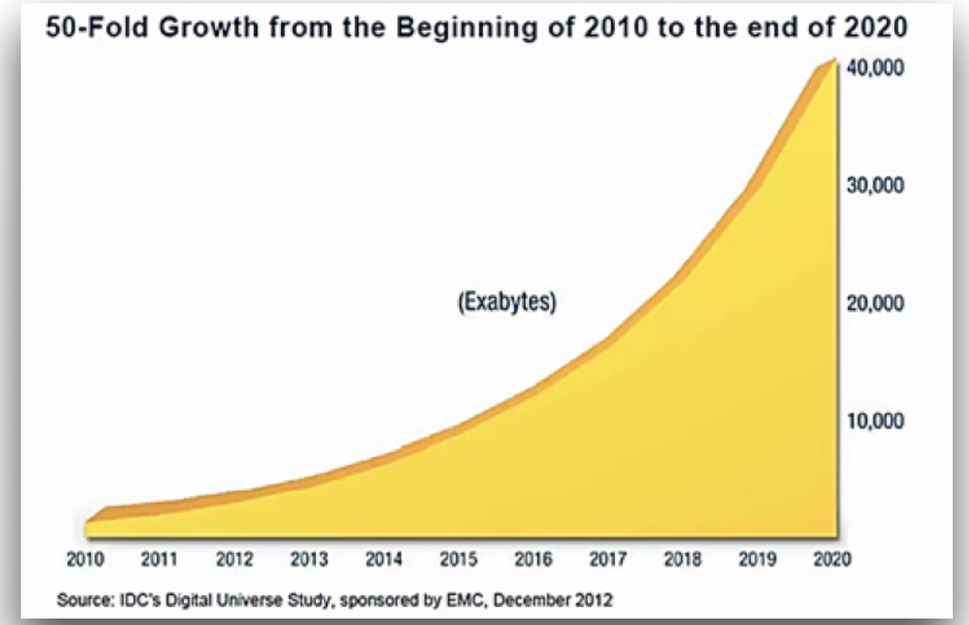
BIS Infrastructure

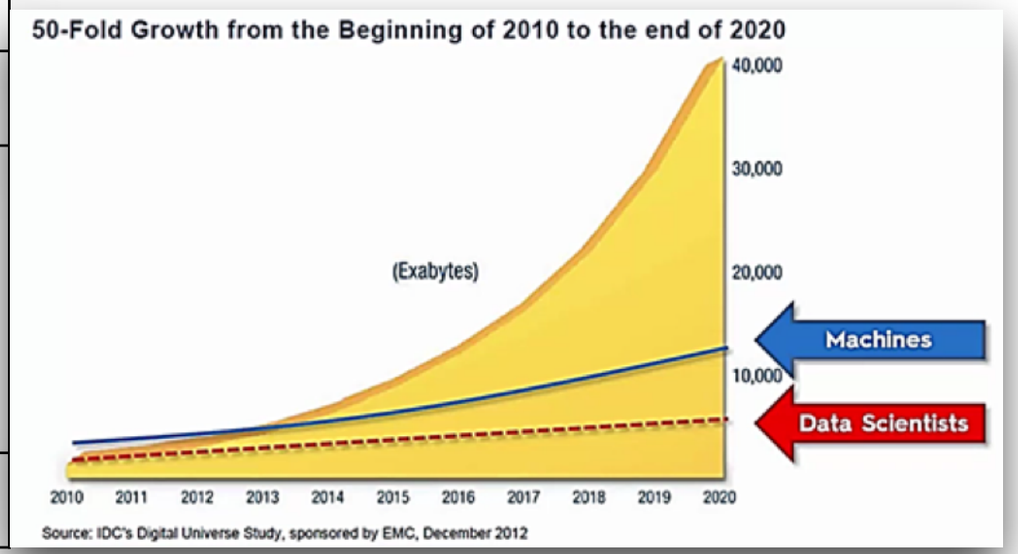
Information Systems in Business (IT Infrastructure)

Moore's Law

Bytes & More

Prefix	Metaphor	Represents
The letter ‘a’	a byte	1 byte
Half a page	1 kilobyte	1000 bytes
A book of about 500 pages	a megabyte	1million bytes
whole human genome when coded (megabyte*1000) - subjective	a gigabyte	1 billion bytes
Film a person for 80 years	a terabyte	1 trillion bytes
All trees (1.4bn acres of 700bn trees) of Amazon forest converted to paper, with both sides written on (terabyte*1000)	a petabyte	
Petabyte*1000	an exabyte	





What is Moore's Law

'while these powerful shrinking chips are getting hotter and more costly to cool, it's also important to realize that chips can't get smaller forever'

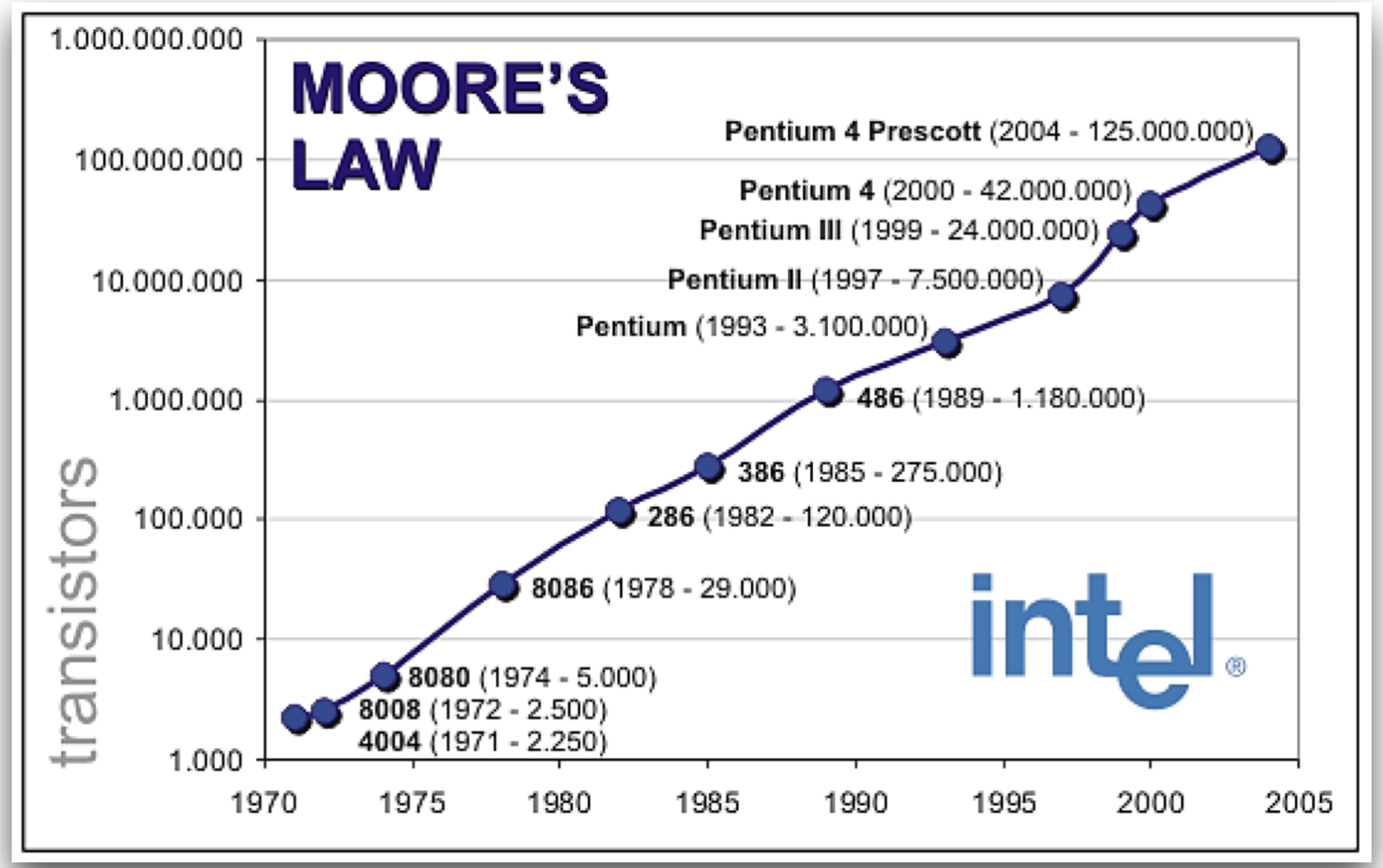
Gordon MOORE, one of the founders of INTEL, recognized this phenomenon in 1965, by proving that,

'the number of transistors and resistors on a chip are doubled every 24 months'.

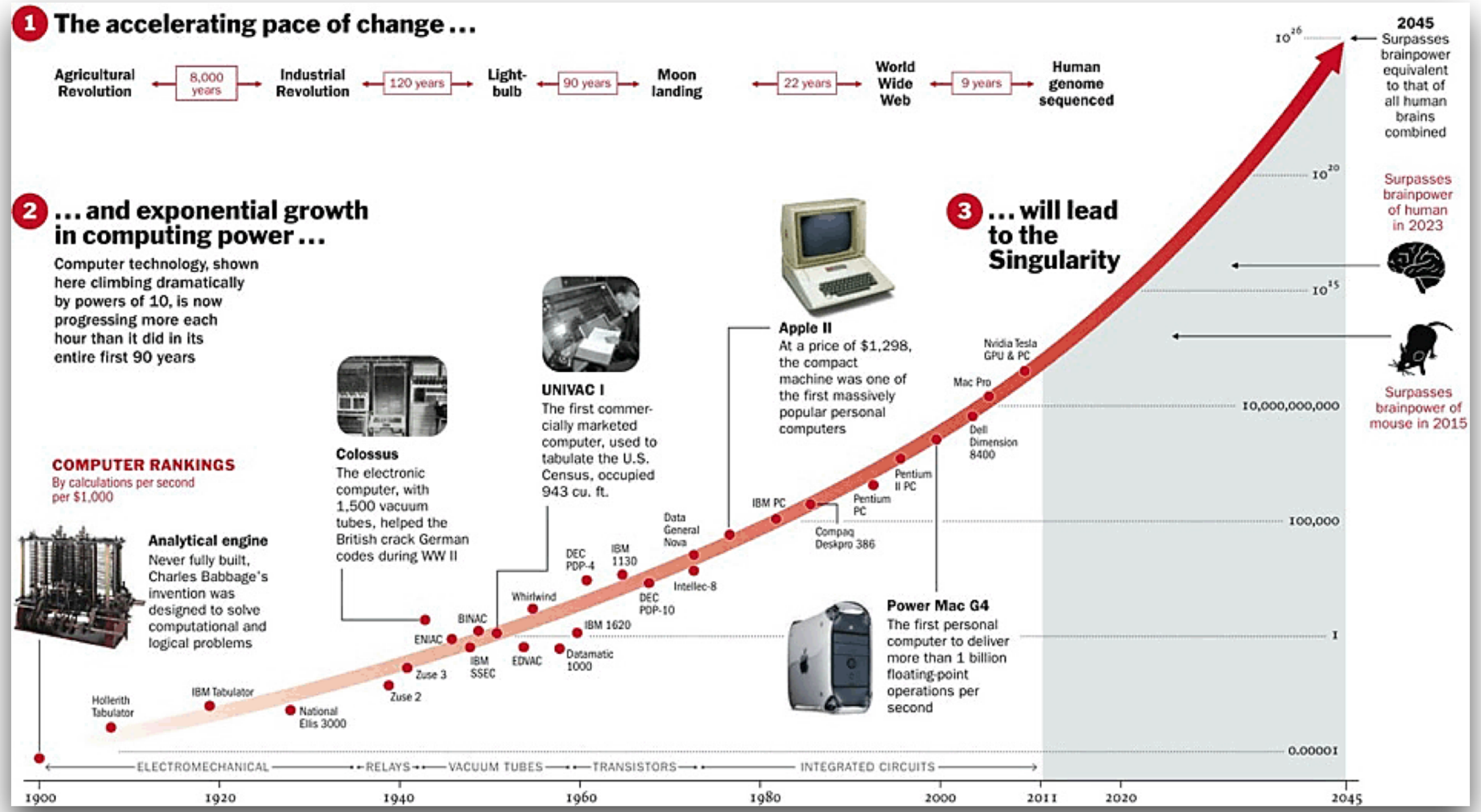
In other words, **computing power will double every two years for the same price**.

Click for More about Moore's Law

What is Moore's Law



What is Moore's Law



What is Moore's Law

Apple II Specs

Item	Specification
CPU:	MOS 6502, 1.0 MHz
RAM:	4K min, 48K max
Display:	280 X 192, 40 X 24 text
	6 colors maximum
Ports:	composite video output
	cassette interface
	8 internal expansion slots
Storage:	generic cassette drive
	external 143K floppy (1978)
OS:	Woz Integer BASIC in ROM

Apple II (1977)

http://oldcomputers.net/indexwp.html

Digibarn

Altair 8800 computer

What is Moore's Law

iMac 27-inch (2017)

Item	Specification
CPU:	4.0GHz quad-core Intel Core i7 processor Turbo Boost up to 4.2GHz
RAM:	8GB (two 4GB) of 1867MHz DDR3 memory; four SO-DIMM slots, user accessible
Display:	27-inch (diagonal) Retina 5K display with IPS technology; 5120- by- 2880 resolution
	millions of colors
Ports:	• 3.5 mm headphone jack • SDXC card slot • Four USB 3 ports (compatible with USB 2) • Two Thunderbolt 2 ports • Mini DisplayPort output • Support for HDMI, DVI, VGA, and dual-link DVI (adapters sold separately) • 10/100/1000BASE-T Gigabit Ethernet (RJ-45 connector) Kensington lock slot
Storage:	1 TB Fusion Drive
	Configurable up to 3 TB Fusion Drive or 256GB, 512GB, or 1TB of flash storage (SSD)
OS:	MacOS Sierra

iMac 27-inch (2017)

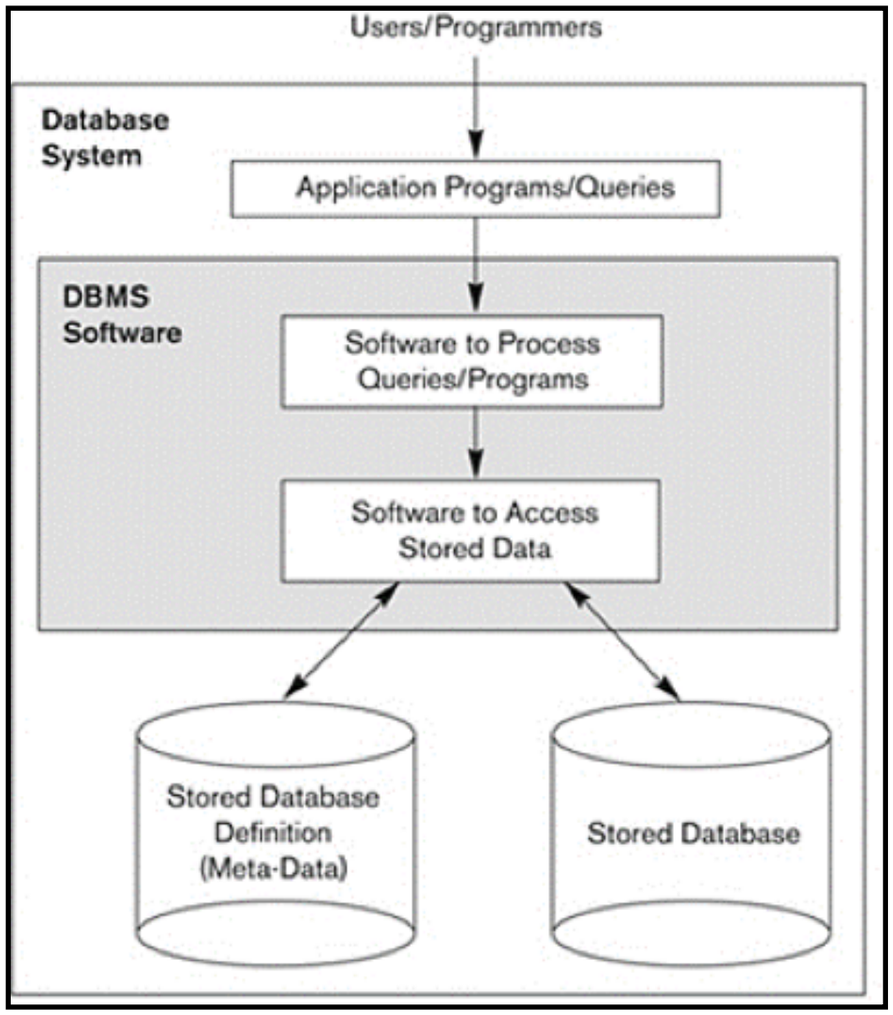
$1999.

What is Database

- A database is just a repository in which you can store information, add some layer of organization to the stored information and grab information when needed.

- A file cabinet is an example of a database. You can throw things into it, pull those things back out and even use files and labels to keep your files organized.

What is Database



Databases are created, maintained, and manipulated using programs called **database management systems (DBMS)** sometimes referred to as ***database software*.**

Key terminologies include:

Table or File – Refers to a list of data. A *database* is either a single table or a collection of related tables.

Column or Field - defines the data that a table can hold. A database with a "Students" table columns shows the data under that column or field

Row or Record - represents a single instance of whatever the table keeps track of.

Key - is the field used to relate tables in a database. E.g., STUDENT_ID key. There is *one* unique attribute for each item in the database. For e.g a one to many relationships among the keys in tables.

Sample Relational Database

Figure 11.1 *A Simplified Relational Database for a University Course Registration System*

Students (1)

STUDENT_ID	FIRST_NAME	LAST_NAME	CAMPUS_ADDR	...
U11-00001	Phil	D'Basket	Weaver Hall 411	
U11-00002	Art	Major	101 Creative Commons	
U11-00003	Anne	Teak	Stickley 014	
U11-00004	Anita	Knapp	Highway View 303	
U11-00005	Easton	West	N. South Hall 123	
U11-00006	Jack	Hammer	Tule 543	
...				

Enrollment (M)

STUDENT_ID	COURSE_INDX	...
U11-00002	9301	
U11-00002	9303	
U11-00002	9306	
U11-00005	9305	
U11-00003	9301	
...		

Course Title (1)

COURSE_NUM	COURSE_NUM	...
MI101	IS for Managers	
MI201	Prog. for Mgmt.	
MI202	Database Sys. & Bus. Intell.	
EN101	Intro. to Lit.	
CJ101	Fighting Cyber-Crime	
...		

Course List (M to Enrollment, 1 to Course Title, M to Faculty)

COURSE_INDX	...	COURSE_NUM	TIME	LOCATION	FAC_ID	...
9301		MI101	MWF 9	Fulton 250	F-100009	
9302		MI101	TTh 10	Fulton 250	F-100010	
9303		MI201	MWF 11	Fulton 150	F-100009	
9304		MI202	TTh 1:30	Fulton 130	F-100009	
9305		EN101	TTh 3	Gasson 205	F-100007	
9306		CJ101	MWF 3	Robsham 021	F-100005	
...						

Faculty (1)

FAC_ID	FIRST_NAME	LAST_NAME	DEPT.	CAMPUS_ADDR	...
F-100005	Marshall	Law	Criminal Justice	Warren 232	
F-100006	Bo	Ring	Sleep Studies	Giles B-12	
F-100007	Paige	Turner	English	Gasson 134	
F-100008	Penny	Wyse	Finance	Fulton 480A	
F-100009	Meg	Abe-Bight	Information Systems	Fulton 460C	
F-100010	Mike	Rowe	Information Systems	Fulton 460B	
...					

What is SQL

MYSQL(DB) & SQL (Language)

Various Procedures carried out in DBMS

Entity test	Attribute	Data types	Constraints (limitations)
Employee	Emp_name	Char (40)	Alphabet Only
	Emp_id	Num (6)	Val>0
	Emp_add	Char (100)	-
	Emp_desig	Char (15)	-
	Emp_dept	Char (10)	Alphabet Only
	Emp_Sal	Number (10.2)	Val>0

1. Defining of a database

The process of *specifying* the data types, structures and constraints is called *Defining the database*

What is SQL

MYSQL & SQL

Various Procedures carried out in DBMS

Emp_name	Emp_id *	Emp_addr	Emp_desig	Emp_Sal
Kristjan	100	Kadriog tee 58, Tallinn	Senior Information Officer	40,000
Pauline	101	#12 Akadeemi a tee,	Project Accountant	42,000
Camille	102	# 202 Kadaka tee, Tallinn	Design Architect	20,000
Melissa	103	# 500 Sauna tee, Tallinn	Cloud Solutions Expert	25,000

2. Construct the database

The process of storing the data on some storage medium

What is SQL

MYSQL & SQL

Various Procedures carried out in DBMS

E.g. for some queries

•List all employees whose salaries are greater than 20,000

•List all employees whose names start with “P”

•Delete records whose Emp_name is Melissa

3. Manipulate the database

Manipulating the Database-involves the retrieval (activity of finding) of required data and modifying it depending on the requirement. E.g. EMPLOYEE database –

MYSQL & SQL

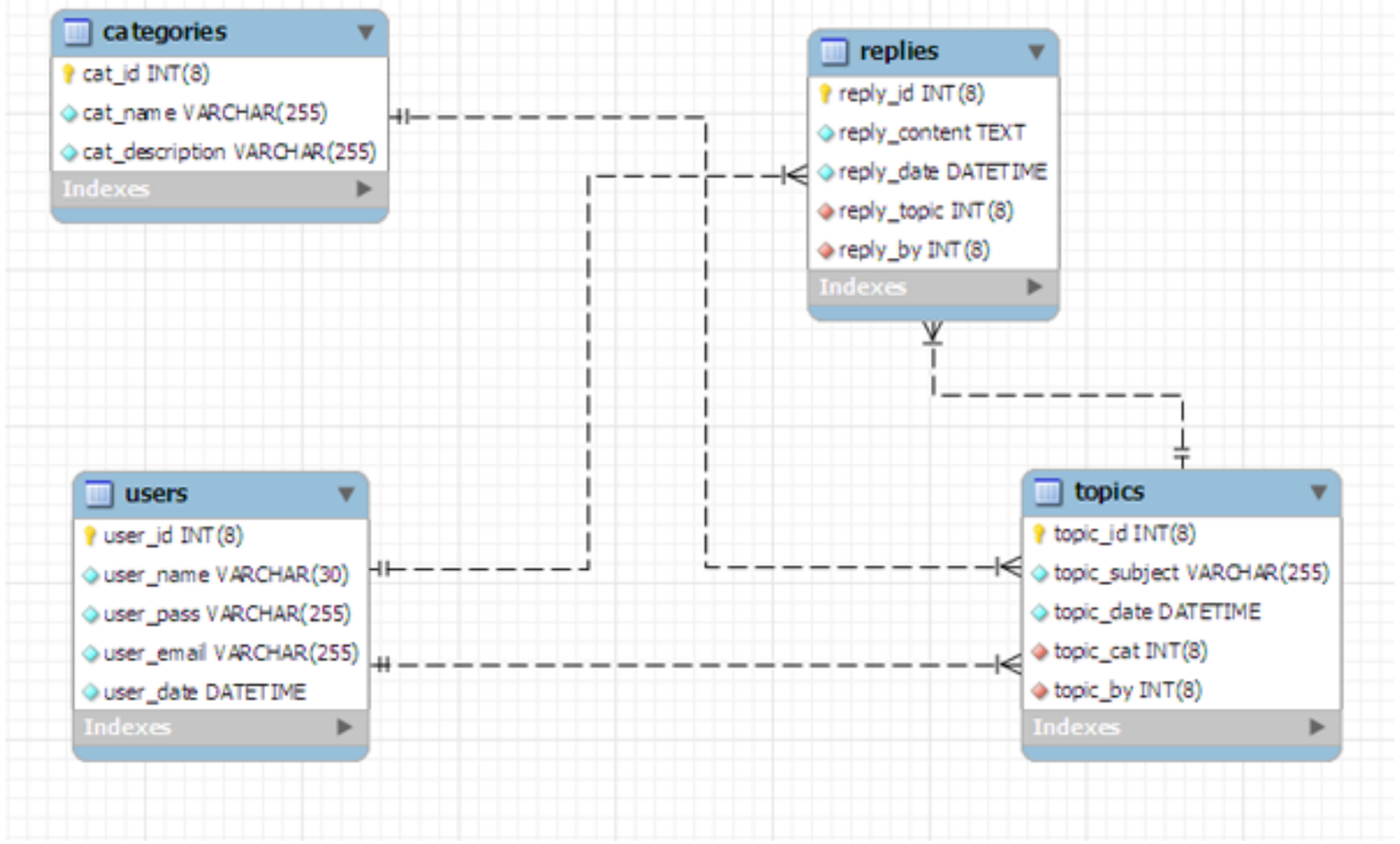
Types of DB Users

- Database Administrator [DBA]
- Database Designers [DBD]
- End Users
- System Analysts and Application Programmers
- DBMS System Designers and Implementers
- Tool Developers

MYSQL & SQL

Types of DB Users

Here is a database of a forum which has **users** who create **topics** in various **categories**. Other users can **post** replies. The lines between them represent entity relationships



What is SQL

MYSQL & SQL

SQL is DB Language

- Structured Query language is used for programming databases. It is sometimes called "*Sequel*"
- The history of SQL began in an IBM laboratory in San Jose, California, where SQL was developed in the late 1970's.
- SQL stands for structured Query Language. It is a non-procedural language, meaning that SQL describes what data to retrieve, delete or insert, rather than how to perform the operation.
- It is the standard command set used to communicate with RDBMS

What is SQL

MYSQL & SQL

SQL is DB Language

An SQL query is not-necessarily a question to the database.

It can be a command to do one of the following.

Create or delete a table.

Insert, modify or delete rows.

Search several rows for specifying information and return the result in order.

Modify security information, etc.

What is SQL

MYSQL & SQL

SQL Data Types

Data type	Description
CHAR(size)	Holds a fixed length string (can contain letters, numbers, and special characters). The fixed size is specified in parenthesis. Can store up to 255 characters
VARCHAR(size)	Holds a variable length string (can contain letters, numbers, and special characters). The maximum size is specified in parenthesis. Can store up to 255 characters. **Note:** If you put a greater value than 255 it will be converted to a TEXT type
TINYTEXT	Holds a string with a maximum length of 255 characters
TEXT	Holds a string with a maximum length of 65,535 characters
BLOB	For BLOBs (Binary Large OBjects). Holds up to 65,535 bytes of data
MEDIUMTEXT	Holds a string with a maximum length of 16,777,215 characters
MEDIUMBLOB	For BLOBs (Binary Large OBjects). Holds up to 16,777,215 bytes of data
LONGTEXT	Holds a string with a maximum length of 4,294,967,295 characters
LONGBLOB	For BLOBs (Binary Large OBjects). Holds up to 4,294,967,295 bytes of data
ENUM(x,y,z,etc.)	Let you enter a list of possible values. You can list up to 65535 values in an ENUM list. If a value is inserted that is not in the list, a blank value will be inserted. **Note:** The values are sorted in the order you enter them. You enter the possible values in this format: ENUM('X','Y','Z')
SET	Similar to ENUM except that SET may contain up to 64 list items and can store more than one choice

What is SQL

MYSQL & SQL

The SQL Statements can be grouped into the following Categories.

DDL(Data Definition Language)

DML(Data Manipulation Language)

DCL(Data Control Language)

TCL(Transaction Control Language)

What is SQL

MYSQL & SQL

Some of The Most Important SQL Commands

- **SELECT** - extracts data from a database
- **UPDATE** - updates data in a database
- **DELETE** - deletes data from a database
- **INSERT INTO** - inserts new data into a database
- **CREATE DATABASE** - creates a new database
- **ALTER DATABASE** - modifies a database
- **CREATE TABLE** - creates a new table
- **ALTER TABLE** - modifies a table
- **DROP TABLE** - deletes a table
- **CREATE INDEX** - creates an index (search key)
- **DROP INDEX** - deletes an index

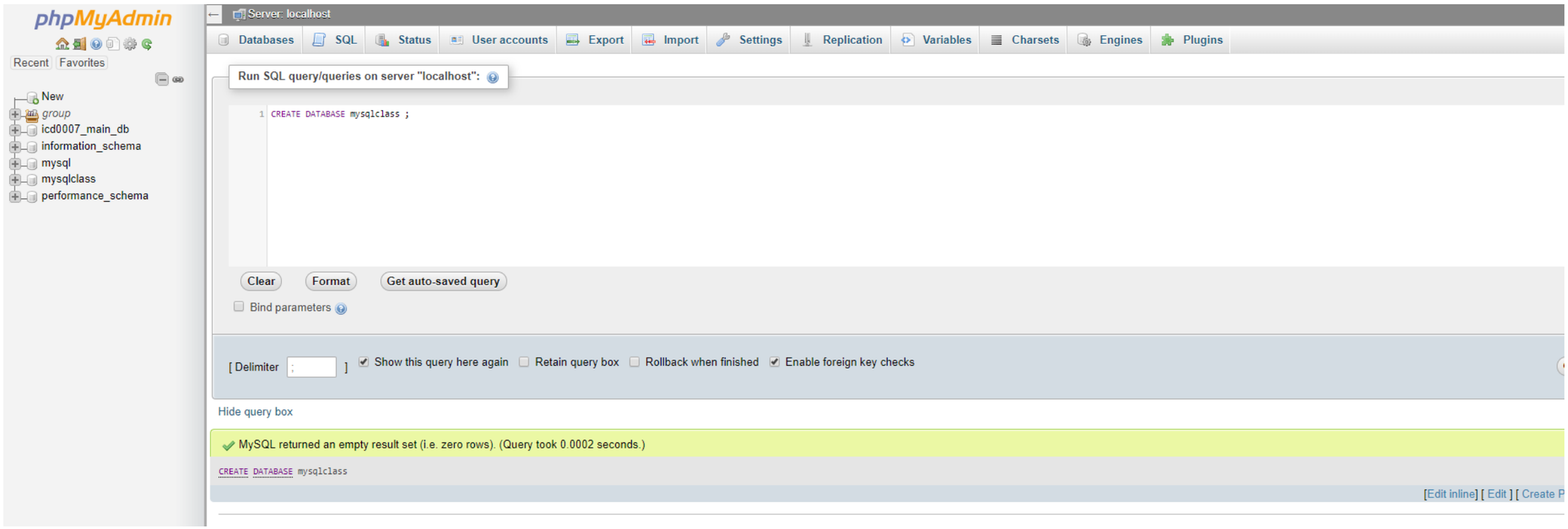
source

CRUD is simply CREATE, READ, UPDATE and DELETE. A CRUD application uses forms to get data into and out of a database.

What is SQL

MYSQL & SQL

CREATE database



What is SQL

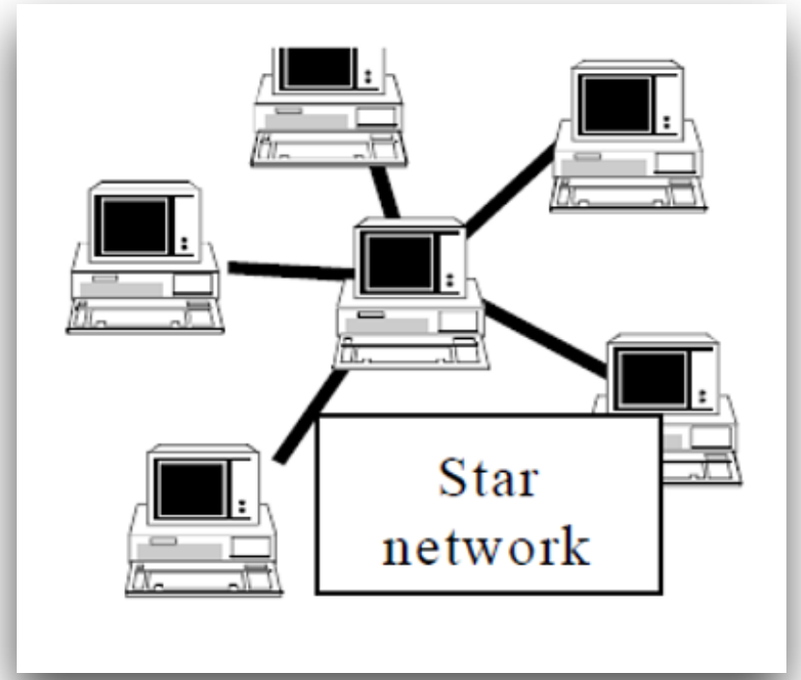
MYSQL & SQL

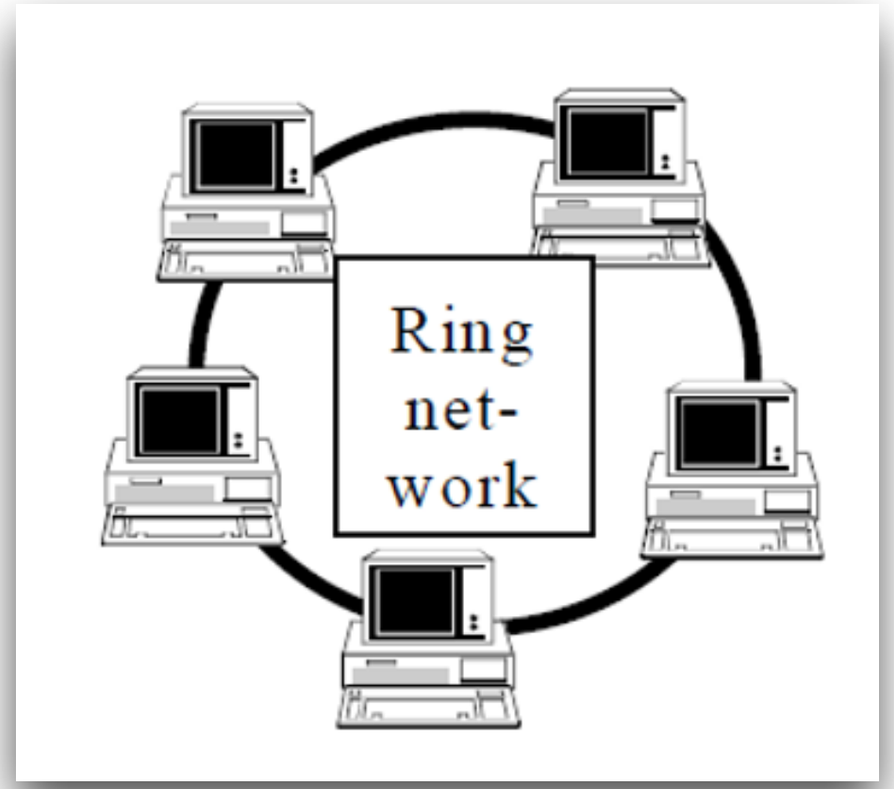
CREATE Table

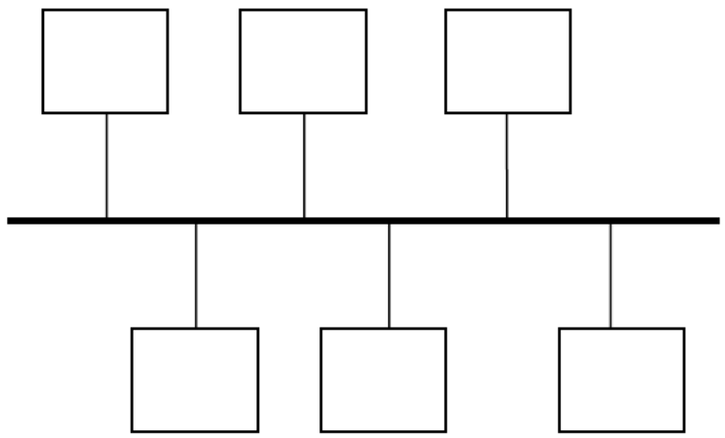
```sql
CREATE TABLE IF NOT EXISTS fruit
(
    id     INT ,
    name   TEXT ,
    color TEXT
) ;
```

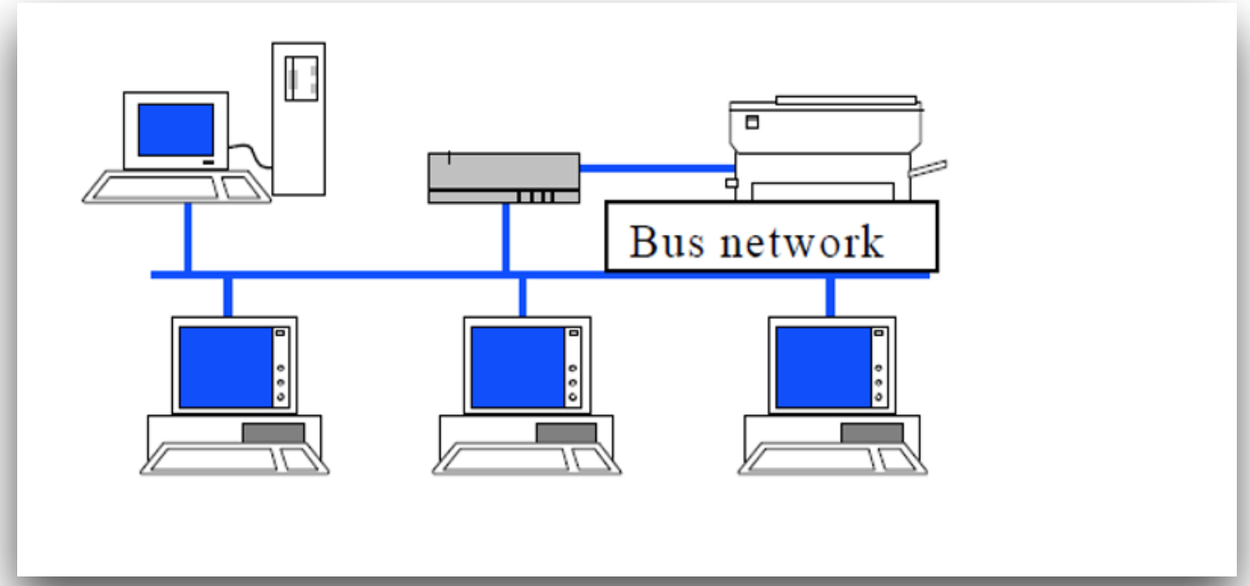
Introduction to Basics of Computer Networks

Networks & Typologies

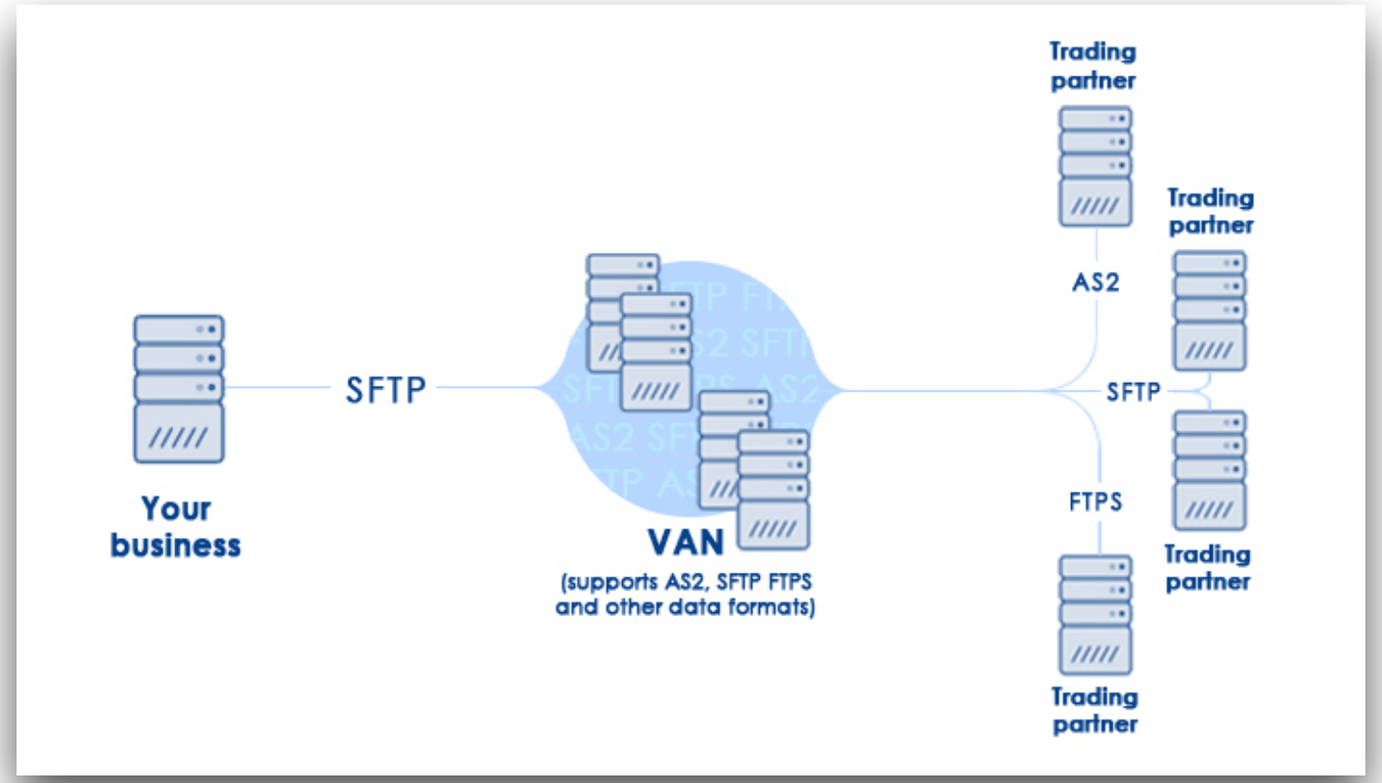








Networks & Typologies



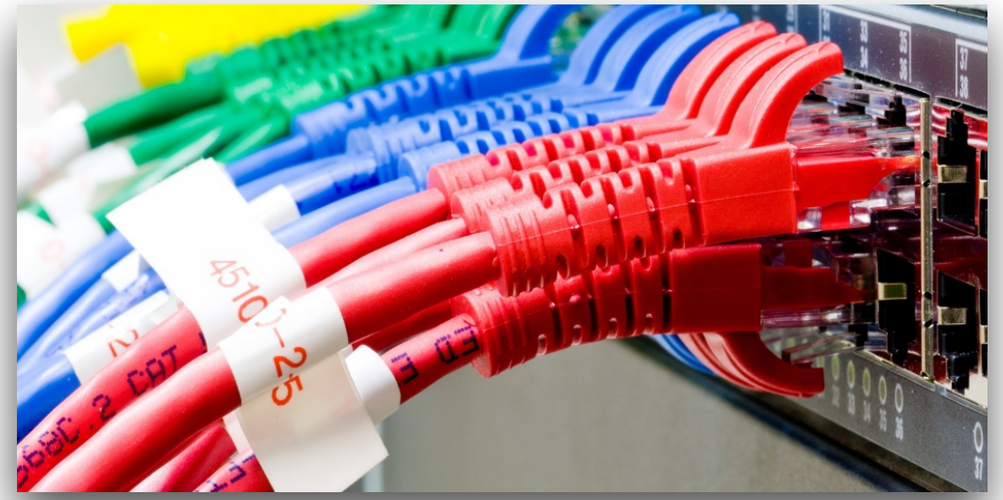
Personal Area Network (PAN): consists of ***2 - 5 computing devices***. (e.g. home networks)

Value-Added Network (VAN): *refers to the provision of network infrastructure service to other businesses*. Includes "value-added services" such as limited data and transaction processing or message routing. (e.g. an **inter-bank Electronic Funds Transfer (EFT)** and clearing service, linking the computers of different commercial banks (and, possibly, retailers) together).

Network & Topologies

LAN (LOCAL AREA NETWORKS)

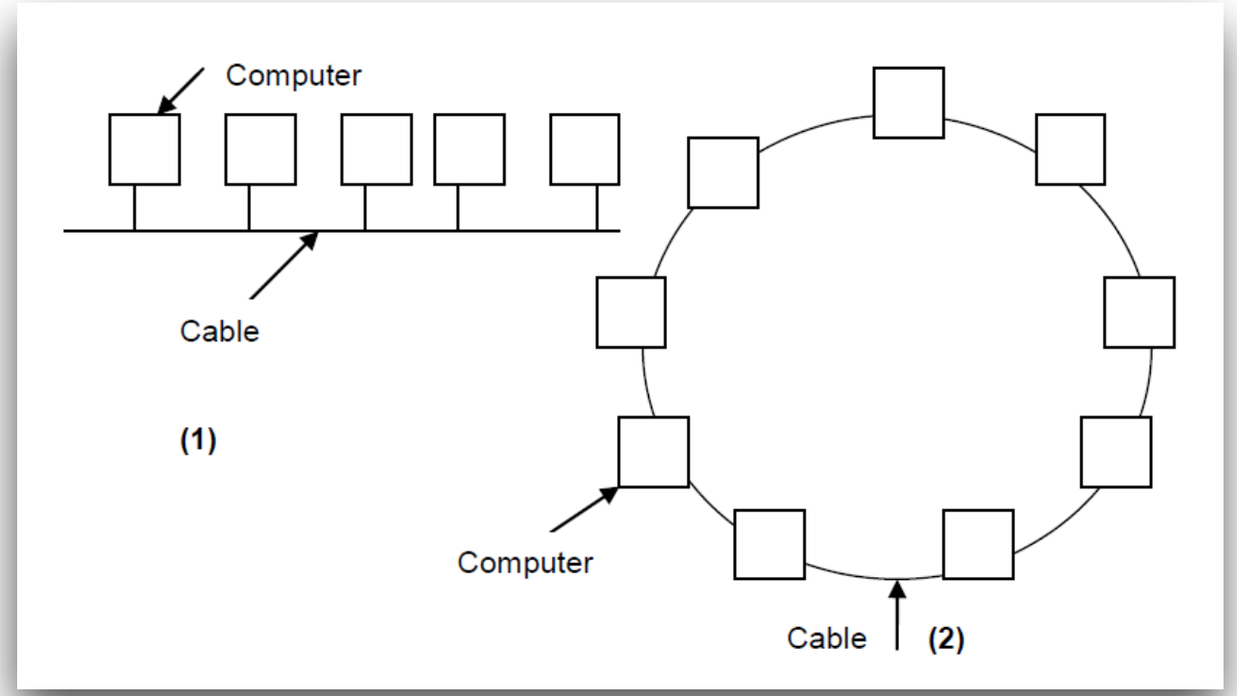
1. Size
2. Transmission Technology
3. Topology



Cable types: CAT=Category

- **RJ-45** – traditional cable (Registered Jack);
- Tel lines use **RJ-11 cables** (4 wires in connector)
- **Unshielded Twisted Pair** (UTP) – CAT 4, 5, 6. (multiple wires, no shield)
- **Shielded Twisted Pair** – not common

- **<u>Most common,</u>** ***4 to more than 100 computing devices*** usually within the same building.
- Controlled by a central file server that takes care of network communications, security control and the storage of data files.
- This Computer LAB has a LAN connection.



Two broadcast networks (1) Bus, (2) Ring

Networks & Typologies

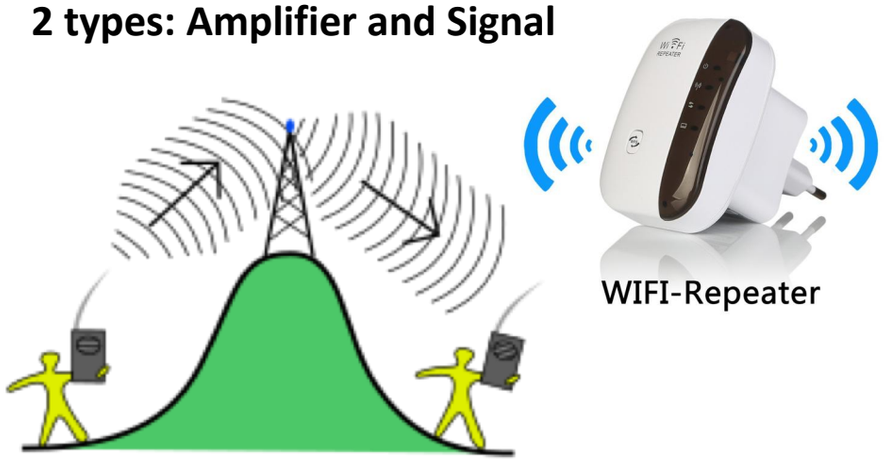
DATA TRANSMISSION

- **Packet:** a unit of data transmission from one computer to another

- **Router**: used to connect two or more networks; far more sophisticated and relays packets also. Some can be programmed

- **Repeater**: device used to boost signal, especially when cables have to go more than 100 meters for UTP.

2 types: Amplifier and Signal



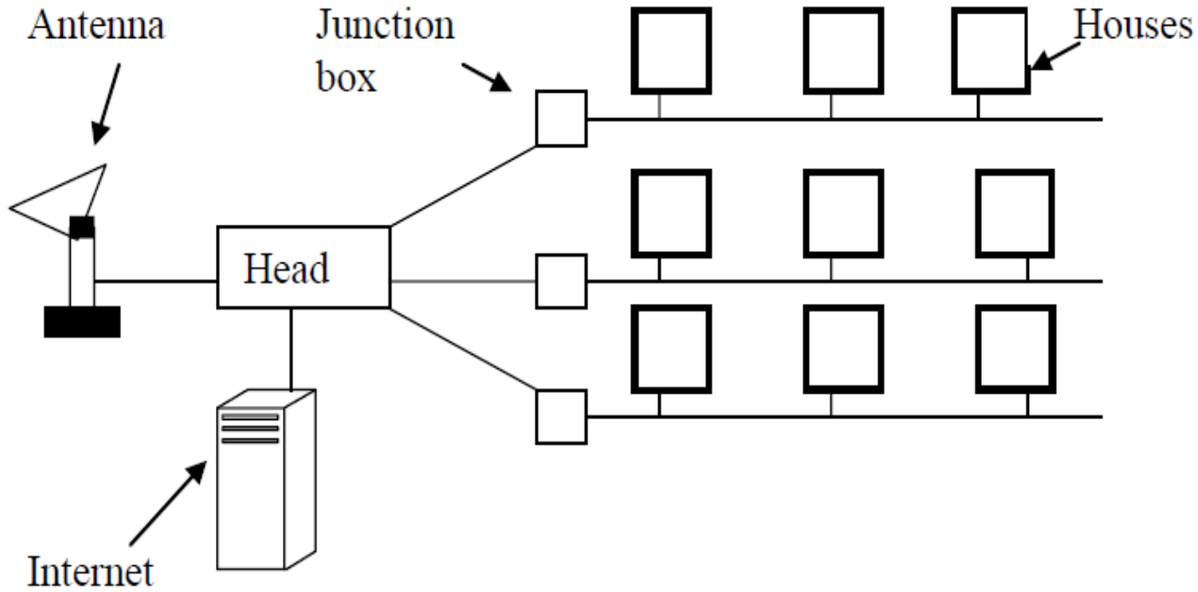
- **Hub:** A small box-shaped electronic device with ***ports*** (connection points) into which cables are plugged. Hubs send out packets but on all ports on the hub. (E.g **USB hub** below; network hubs, etc)

- **Switch:** An intelligent hub which is able to determine where a packet is being sent.

Networks & Typologies

MAN (METROPOLITAN AREA NETWORKS)

- a network infrastructure linking various local businesses within a large city area.
- MANs provide higher data rate and uses co-axial cable or optical fiber as transmission media.
- This is now almost completely superseded by the Internet.



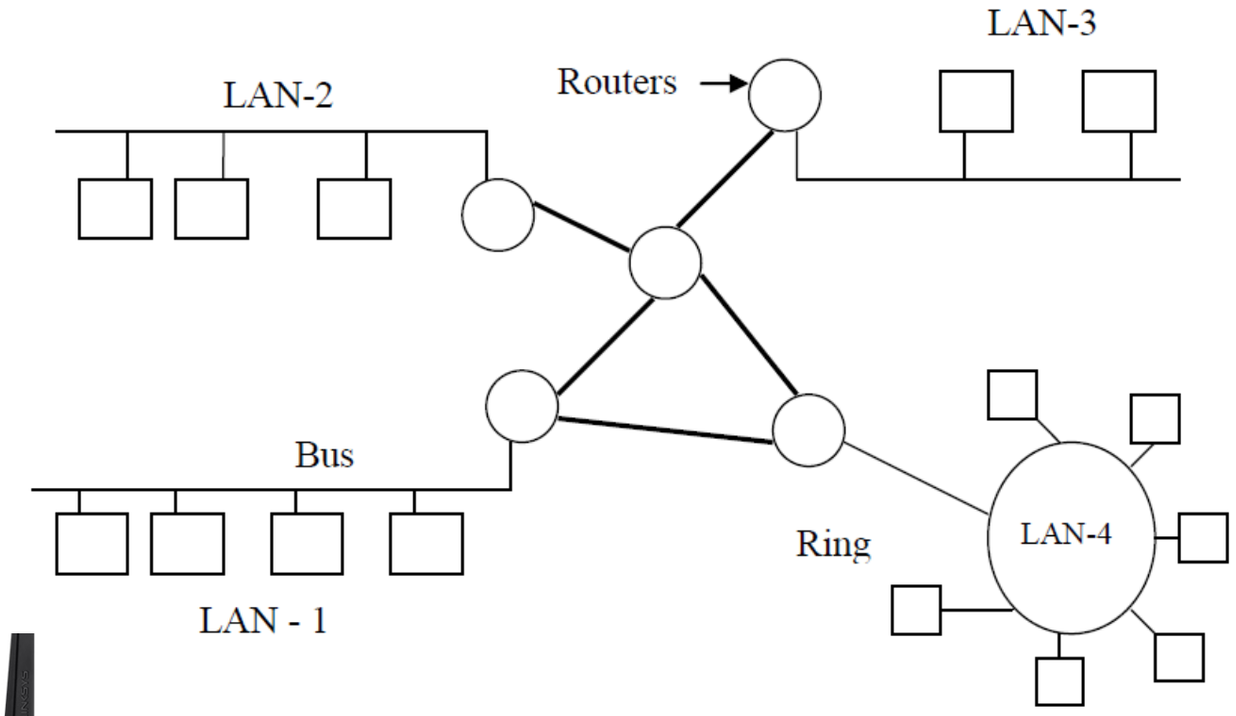
A metropolitan area network like cable TV

Networks & Typologies

Wide Area Network (WAN): the opposite of the LAN. It links computers over large geographical areas. (e.g. Automatic Teller Machine (ATM) network of a commercial bank is typically part of the bank's WAN.

WAN consists of two components:

- **Transmission lines** are responsible for moving bits between machines and they are made up of copper wire, or co-axial cable, or optical fiber or radio frequency links, etc. (**e.g. Wireless links**).



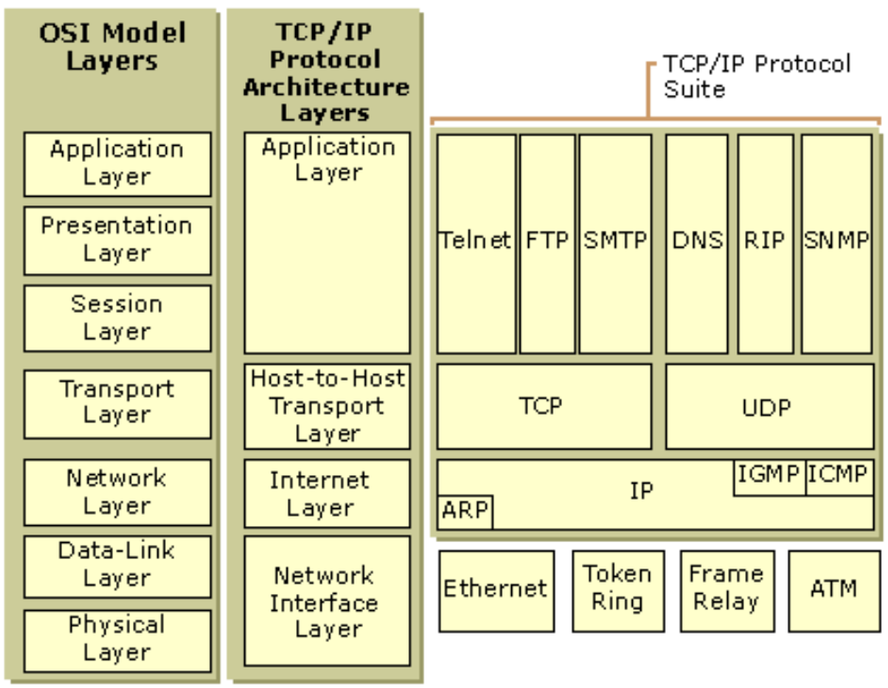
WAN with host on LANs and Routers

- **Switching elements** are small and specialized computers that connect three or more transmission lines. They move and switch packet from one host to another (**e.g. Routers**)

Networks & Typologies

TCP/IP Protocol Architecture

TCP/IP protocols map to a four-layer conceptual model known as the ***DARPA model***, named after the U.S. government agency that initially developed TCP/IP. The four layers of the DARPA model are: **Application**, **Transport**, **Internet**, and **Network Interface**. Each layer in the DARPA model corresponds to one or more layers of the seven-layer Open Systems Interconnection (OSI) model.



Application Layer - used for the exchange of user information. provides applications the ability to access the services of the other layers and defines the protocols that applications use to exchange data.	Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), Telnet *The following protocols help facilitate the use and management of TCP/IP networks:* Domain Name System (DNS), Routing Information Protocol (RIP), Simple Network Management Protocol (SNMP)
Transport Layer - is responsible for providing the Application layer with session and datagram communication services	Transmission Control Protocol (TCP), User Datagram Protocol (UDP)
Internet Layer - is responsible for addressing, packaging, and routing functions.	Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Internet Group Management Protocol (IGMP)
Network Interface Layer - is responsible for placing TCP/IP packets on the network medium and receiving TCP/IP packets off the network medium. TCP/IP was designed to be independent of the network access method, frame format, and medium. In this way, TCP/IP can be used to connect differing network types. These include LAN technologies such as Ethernet and Token Ring and WAN technologies such as X.25 and Frame Relay	User Datagram Protocol (UDP), Transmission Control Protocol (TCP),

Networks & Typologies

TCP/IP Protocols

FTP (File Transfer Protocol)	For transferring files between computers
Telnet	Used to remotely log on to a system using command prompts or shells to execute commands
SMTP (Simple Mail Transfer Protocol)	Sends email
DNS (Domain Name Service)	Translate URLs into Web addresses.
HTTP (Hyper Text Transfer Protocol)	Displays web pages
POP3 (Post Office Protocol Version 3)	Retrieves email.
WhoIS	A command that queries a target IP address for information

OTHER INTERNET TERMS	Check Your IP address; IP Check 2
IPv4 (Internet Protocol version 4) [Between 0 and 255] Limited to 4.2 billion IP addresses	IP address in a series of 4 values; called an octet because each of the number is a decimal representation of 8 bits; **4 octets in an IPv4 address** (e.g. 107.22.98.198)
Subnetting	Chopping up a network. Subnet mask is a 32-bit number assigned to each host to divide the 32-bit binary IP address into network and node portions
IPv6 (Internet Protocol version 4)	Utilizes a 128-bit address. Uses a hexadecimal numbering method. The address appears like this: (e.g **3FFE:B00:800:2::C)**
URL (Uniform Resource Locator)	Name we type to locate a Web address (e.g. www.andrewsai.com) A DNS protocol translates a web address into an IP address that computers understand

Networks & Typologies

Internet Applications

Major components in the e-mail system:

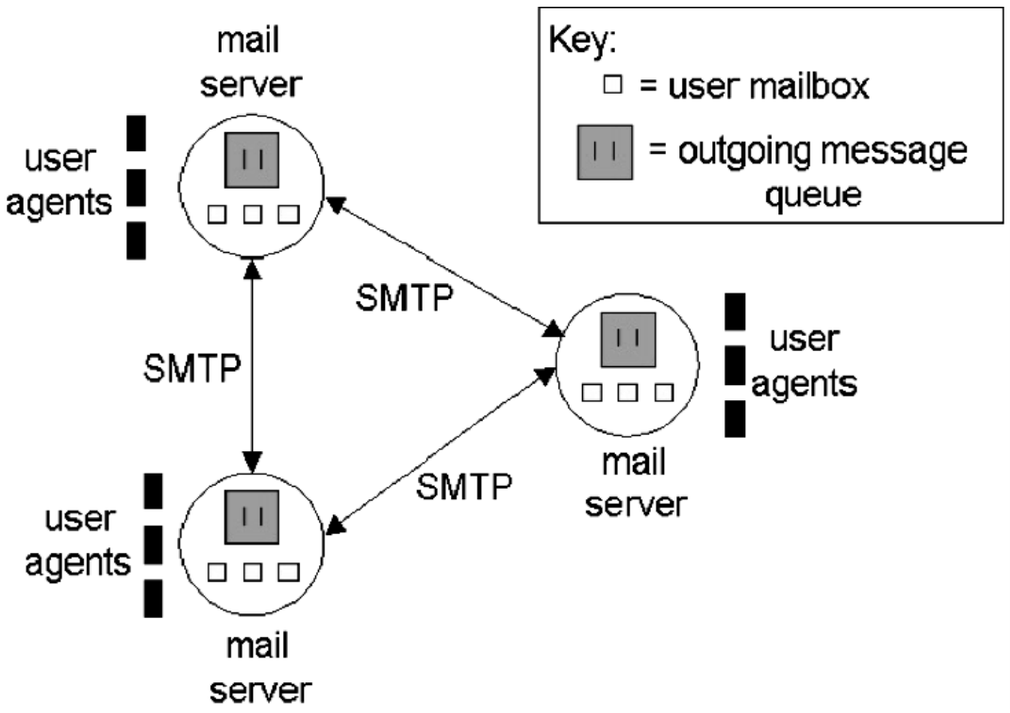
- **User agents** allow users to read, reply to, forward, save, and compose messages. (User agents for electronic mail are sometimes called **mail readers**).

Mail servers

- Each recipient has a mailbox located in one of the mail servers.
- Mailbox manages and maintains the message that has been sent.
- A typical message starts its journey in the sender's user agent, travels to the sender's mail server, and then travels to the recipient's mail server, where it is deposited in the recipient's mailbox.

- **The Simple Mail Transfer Protocol (SMTP)** is the principal application-layer protocol for Internet electronic mail. It uses the reliable data transfer service of TCP to transfer mail from the sender's mail server to the recipient's mail server.
- SMTP has two sides: **a client side** which executes on the sender's mail server and
- **server side** which executes on the recipient's mail server.

- When a mail server sends mail (to other mail servers), it acts as **an SMTP client**. When a mail server receives mail (from other mail servers) it acts as **an SMTP server**.

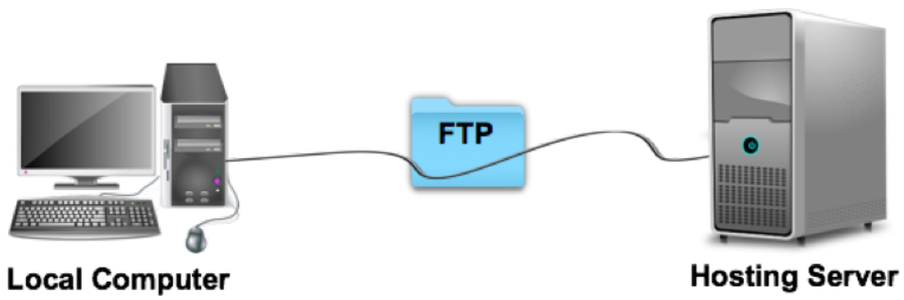


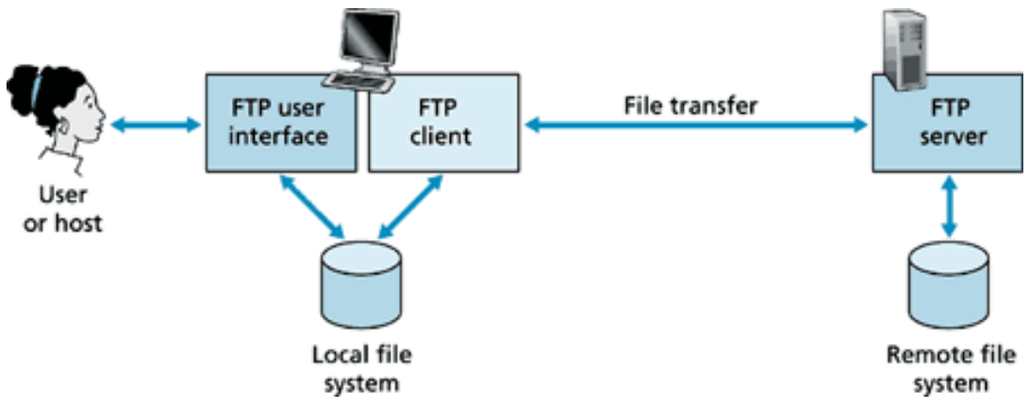
Networks & Typologies

FTP (File Transfer Protocol)

FTP is a protocol for transferring a file from one host to another host. :

- User (on a **local host**) interacts with FTP through an **FTP user agent**.
- The user first provides the **hostname** of the **remote host**, which causes the FTP client process in the local host to establish a TCP connection with the FTP server process in the remote host.
- The user then **provides the user identification and password,** which gets sent over the TCP connection as part of FTP commands.
- Once the server has authorized the user, the user copies one or more files stored in the local file system into the remote file system





FTP moves files between local and remote file systems

Networks & Typologies

HTML

- Web pages are mostly written in a language called **HTML (Hyper Text Markup Language).**
- HTML allows users to produce Web pages that include text, graphics, and pointers to other Web pages.
- HTML is a markup language, a language for describing how documents are to be formatted.
- Markup languages thus contain explicit commands for formatting.

Tag	Description
<html> ... </html>	Declares the Web page to be written in HTML
<head> ... </head>	Delimits the page's head
<title> ... </title>	Defines the title (not displayed on the page)
<body> ... </body>	Delimits the page's body
<h *n*> ... </h *n*>	Delimits a level *n* heading
...	Set ... in boldface
...	Set ... in italics
...	Center ... on the page horizontally
...	Brackets an unordered (bulleted) list
...	Brackets a numbered list
...	Brackets an item in an ordered or numbered list
 	Forces a line break here
<p>	Starts a paragraph
<hr>	Inserts a horizontal rule
<img src="...">	Displays an image here
 ... 	Defines a hyperlink

- Most browsers have a menu item VIEW SOURCE. Selecting this item displays the current page's HTML source, instead of its formatted output.

You can also try this on your computer

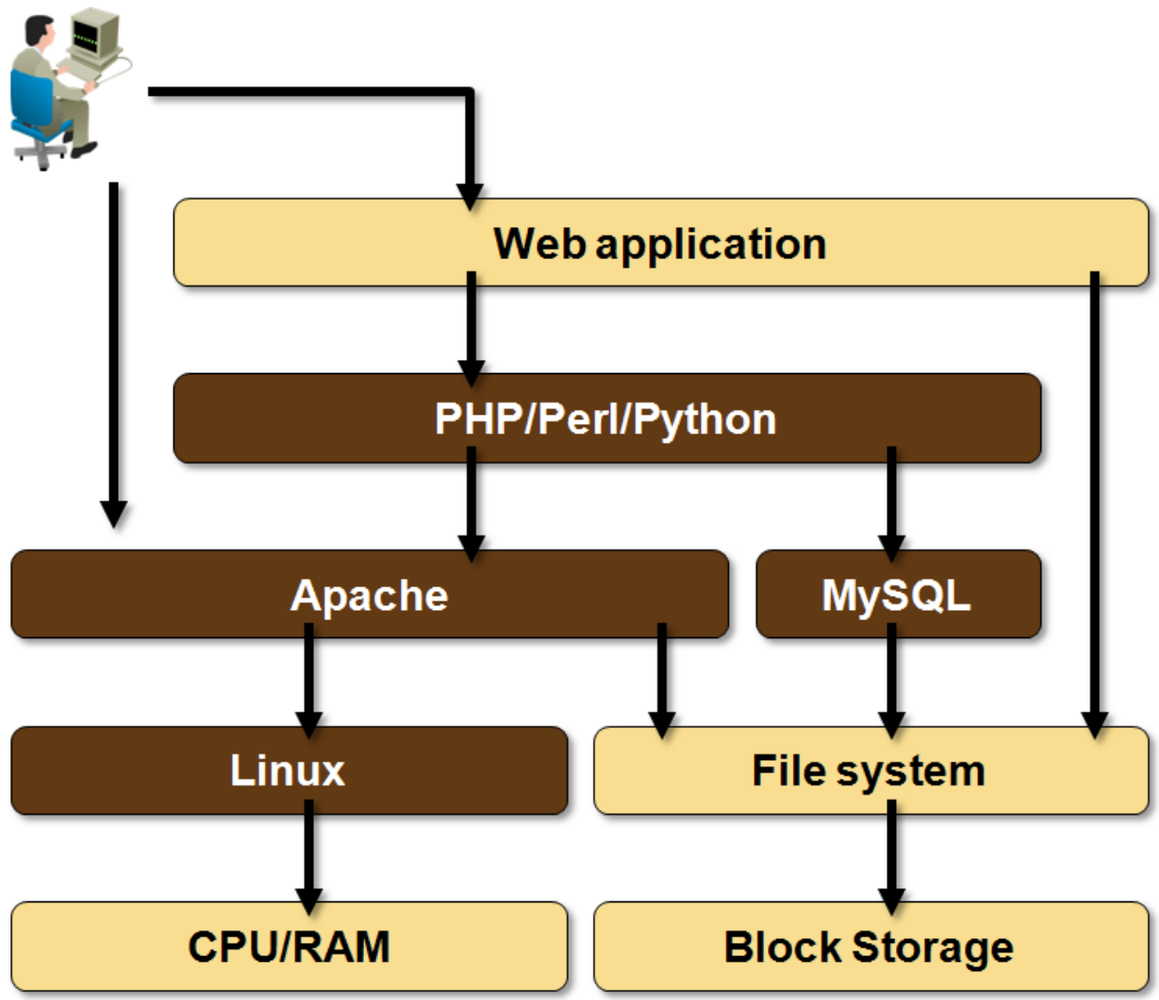
- Open Notepad on your computer
- Upload the script below:

```
<!DOCTYPE
html>
<html>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
```

- Save the file in a *.html* format
- Go to the folder and open and saved document
- It opens in the browser if saved as *.html*
- Now, go to the View Source on the page in the browser. You should see the script above on the page which opens.

LAMP Stack

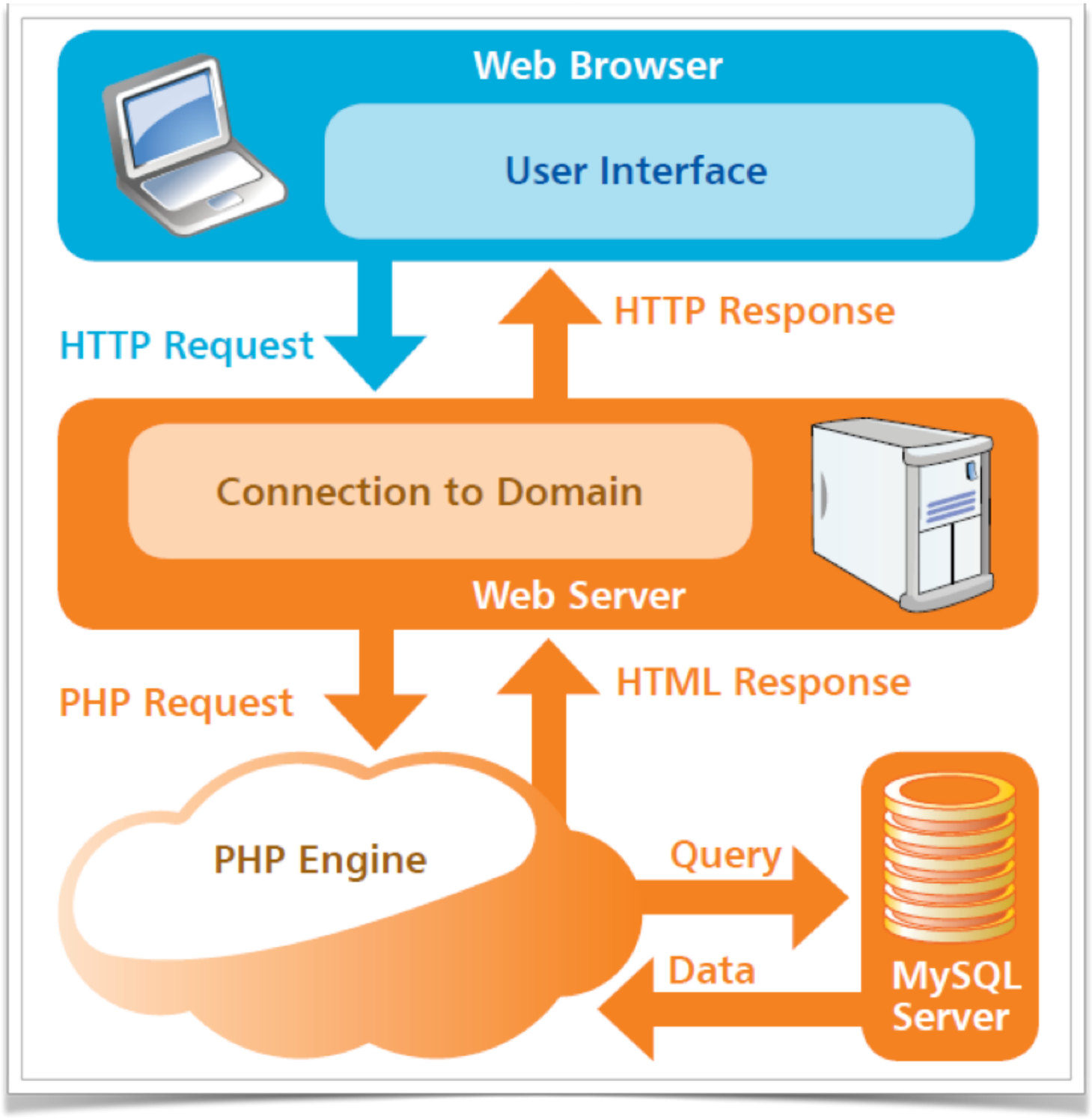
LAMP stack is a popular **open source web platform** commonly used to run dynamic web sites and servers. It is considered by many the platform of choice for development and deployment of high performance web applications which require a solid and reliable foundation.



Short for **Linux**, **Apache**, **MySQL** and **PHP**, an open-source Web development platform, also called a **Web stack**, that uses:

- **Linux as the operating system**,
- **Apache as the Web server**,
- **MySQL as the RDBMS,**and
- **PHP as the object-oriented scripting language**. Perl or Python is often substituted for PHP.

The Web Ecosystem



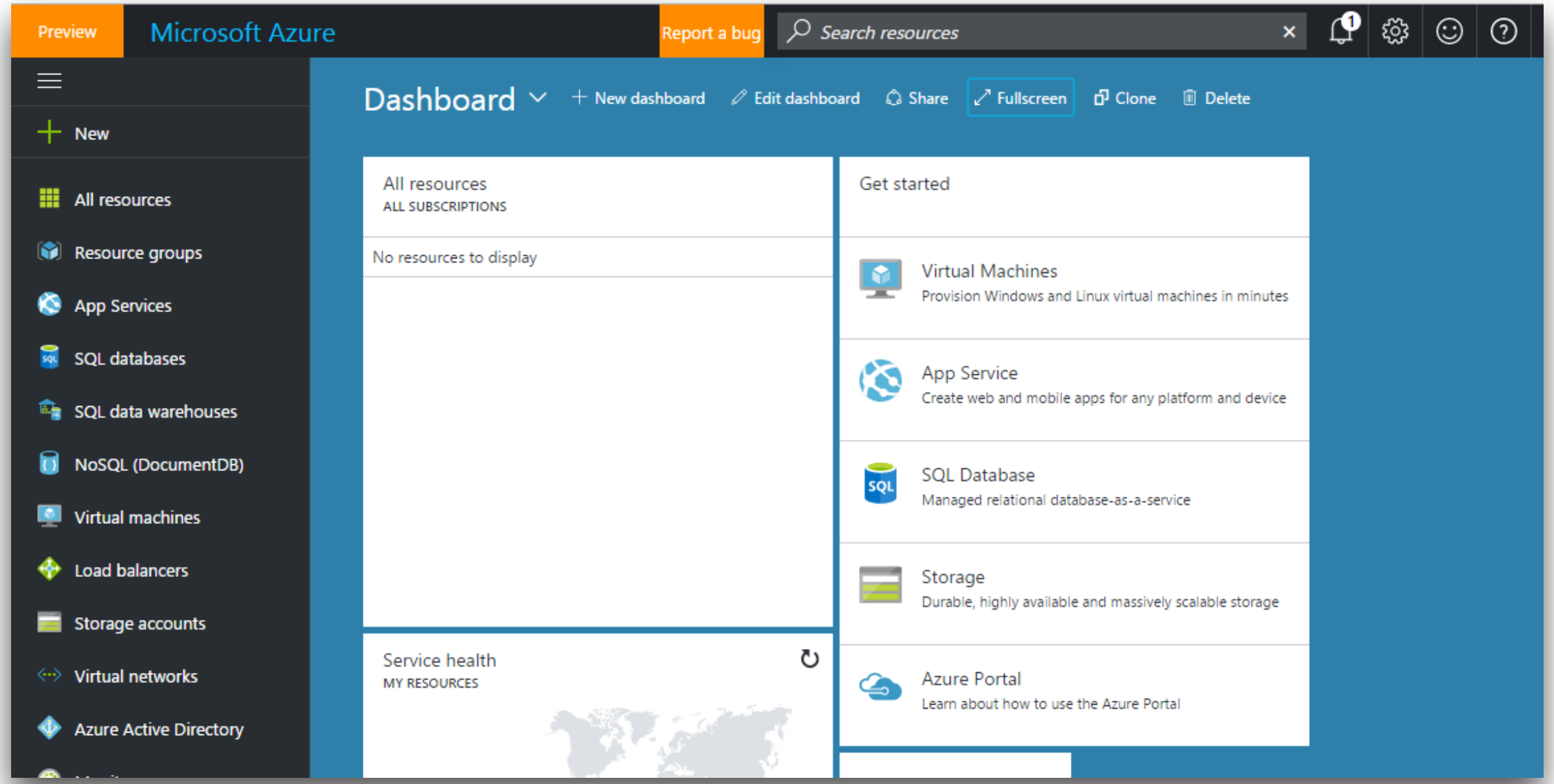
Cloud Computing

It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services), which can be rapidly provisioned and released with minimal management effort.

Separate categories of cloud computing:

1. **Software as a service (SaaS),** is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. SaaS is typically accessed by users using a thin client via a web browser.
2. **Platform as a service (PaaS),** is a category of cloud computing services that provides a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.
3. **Infrastructure as a service (IaaS)** is a service model that delivers computer infrastructure on an outsourced basis to support enterprise operations. Typically, IaaS provides hardware, storage, servers and data center space or network components; it may also include software.

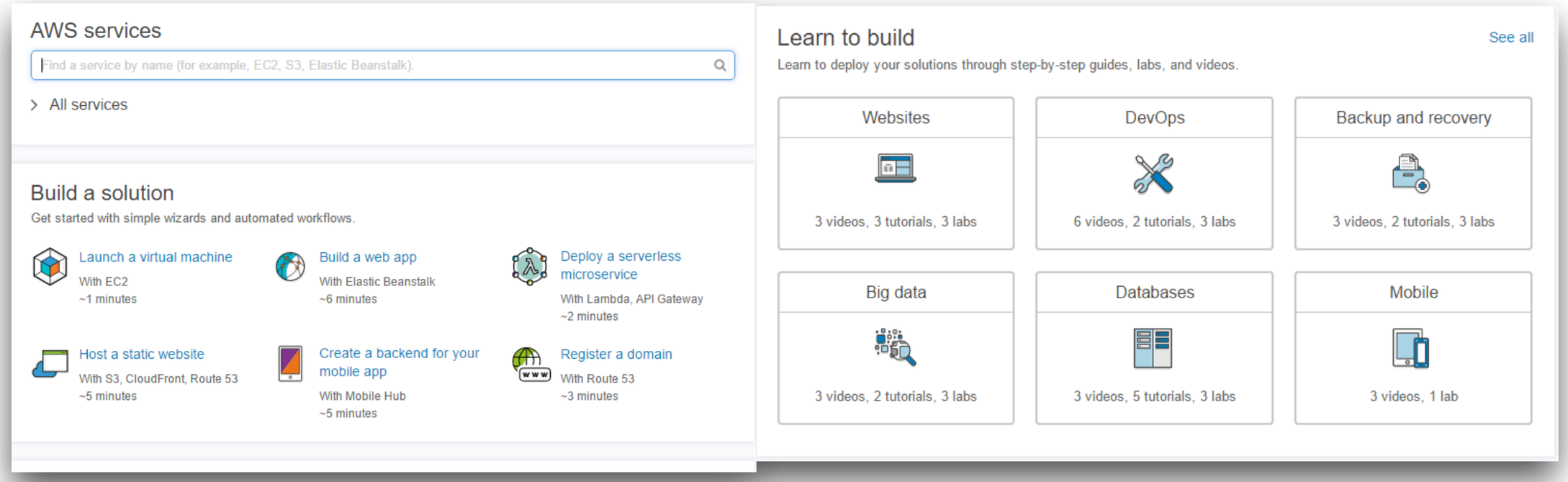
Microsoft Azure



https://www.youtube.com/watch?v=rfSYypHtuUw

Amazon Web Services

AWS video



AWS portal

Questions?

Best of luck!

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Connect on LinkedIn: Click here
Research & Publications: Click here