Application Servers

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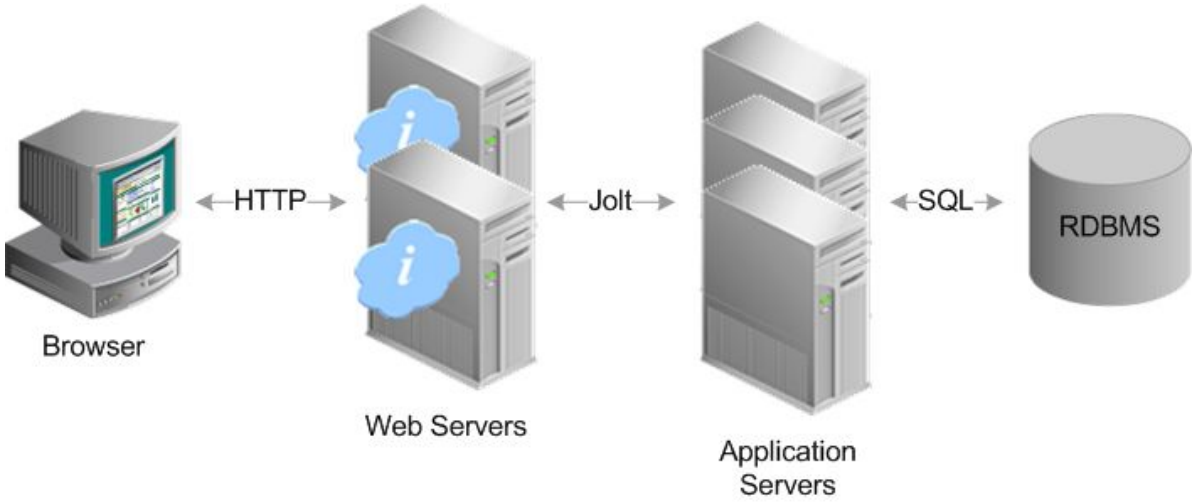
Tools ➜ Security ➜ Custom Zones

Application Servers

Servers that...run applications
Tend to be Windows machines

What kinds of servers are application servers?

- Database servers
- Mail servers
- Collaboration servers
- etc.



Application Servers

Only used for application processing:

- An Outlook server will **not** be used to host Active Directory Domain Services and process logins

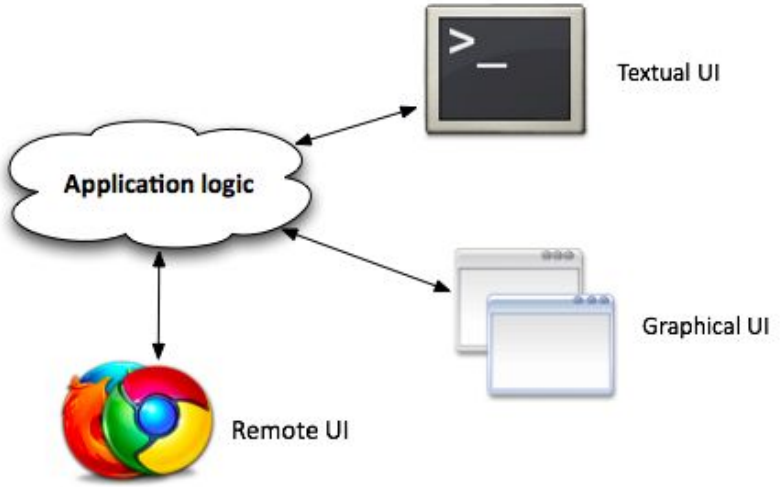
Optimized for supported client/server application:

- Compiled for target machine

Accessible by multiple clients:

- Users connect via a local client or indirectly through another server app

Application Logic (Code)



Localized
- All exists on local (client) machine
- Nothing server-based

Distributed
- Logic can exist on client, application server(s)

Centralized
- All logic housed in application server

Benefits of Centralized (or why we use Application Servers)

Improved security
- Can’t really hack client application
- All data access centrally controlled

Assuming that a flaw isn’t exploited server-side…

Improved data integrity
- Easy backup of user data
- Application can be fixed for all users *centrally*
  - Don’t need to distribute patches to clients

Database Servers

Database != Database Server

Database is separate from the database management system (DBMS)

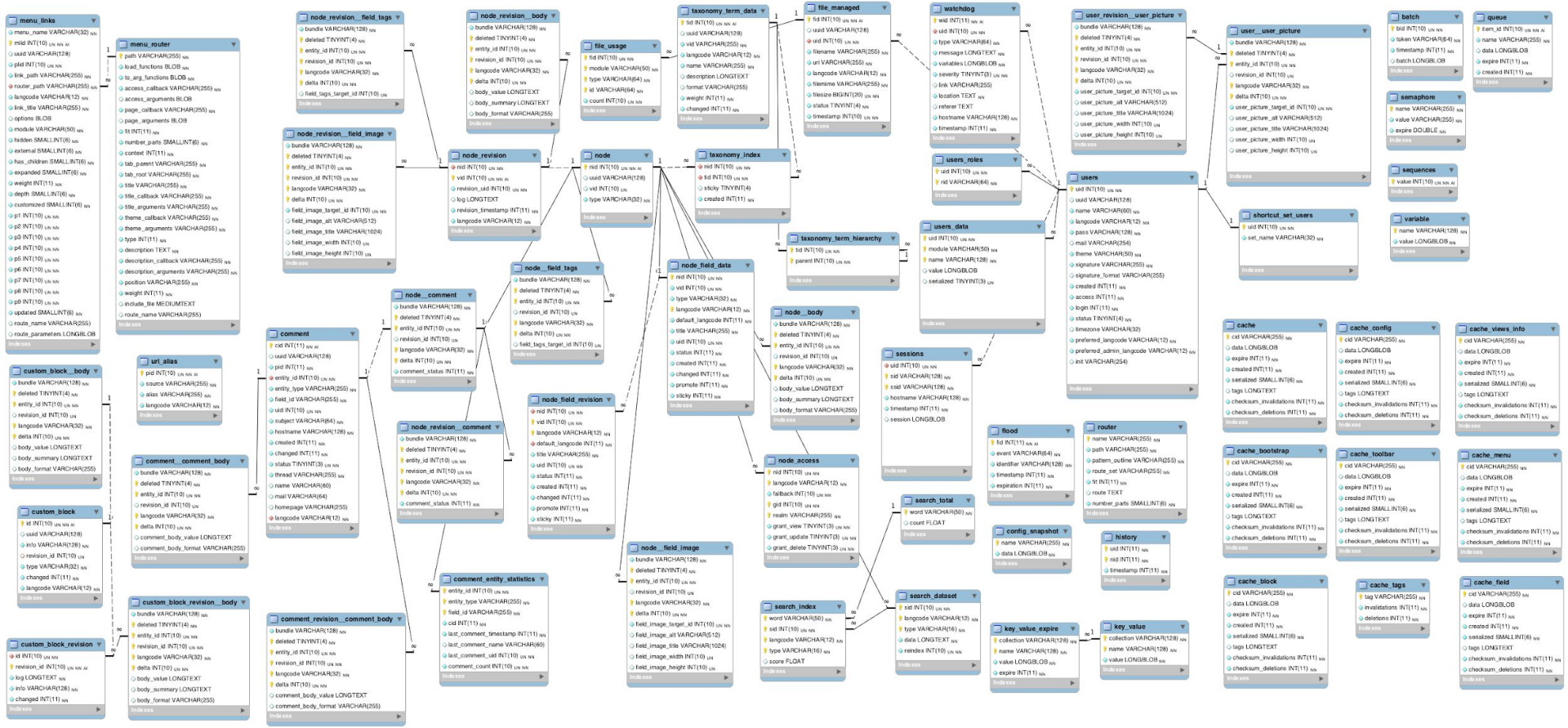
SQL Server is the DBMS for Windows
(MySQL/MariaDB is what we used in Linux)

Databases can be **detached** and moved to other database servers
Technically, can attach any object that communicates via Open Database Connectivity (ODBC)
E.g., Excel spreadsheets, Access databases (ew), Word documents, etc.

MS SQL Server

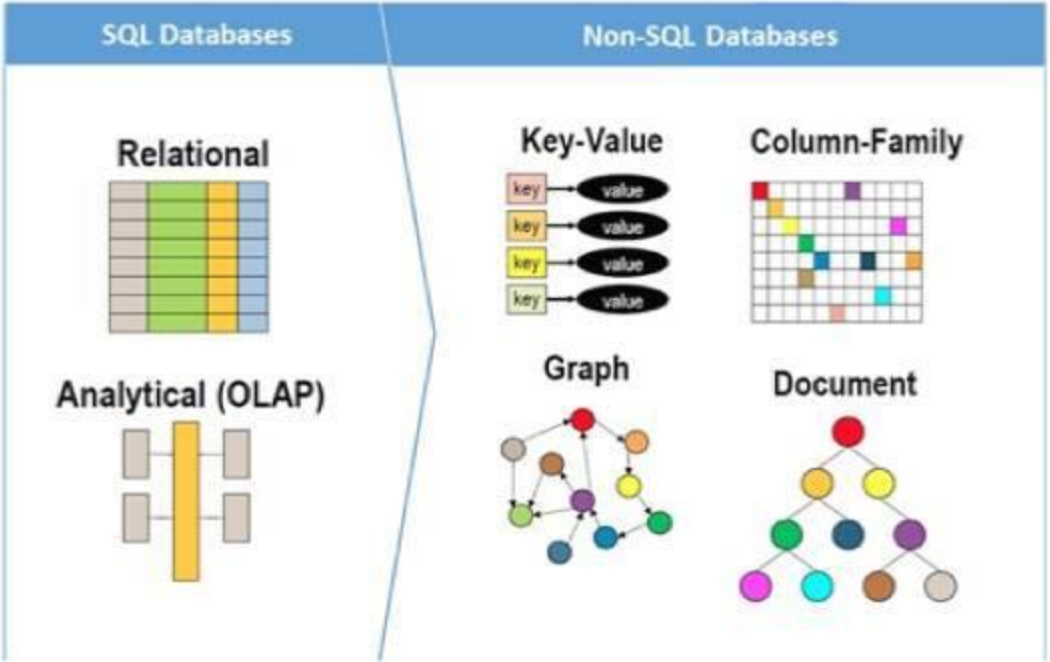
Relational database management system
- Tables, schemas, etc.
- What's a non-relational database?

Comes in several flavors
- Standard
  - ➔ "Best" for general business applications
- Enterprise
  - ➔ Resource management, data encryption
- Express
  - ➔ "The free version"
- Compact
  - ➔ Embedded applications
- ...



→ Embedded applications

noSQL: “Not Only SQL”



https://kvaes.files.wordpress.com/2015/01/1401269083847.jpg?w=840

Three Types of Database Applications

Localized

Client/server

N-tier

Localized

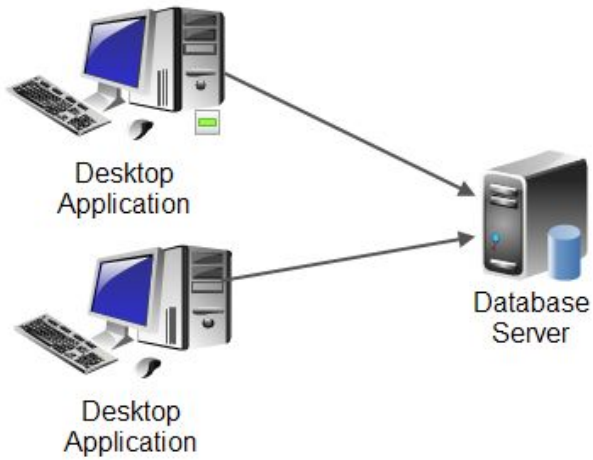
Uses a ‘local’ installation of SQL server

- Or, Access on steroids
- Uses shared memory for connection (no NIC)
- Not really useful for us if we’re running a server environment

Client/Server

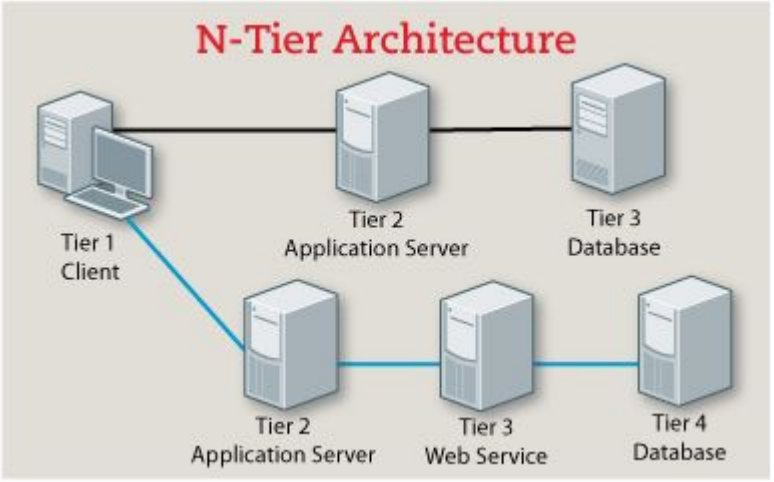
Single-tier DB application

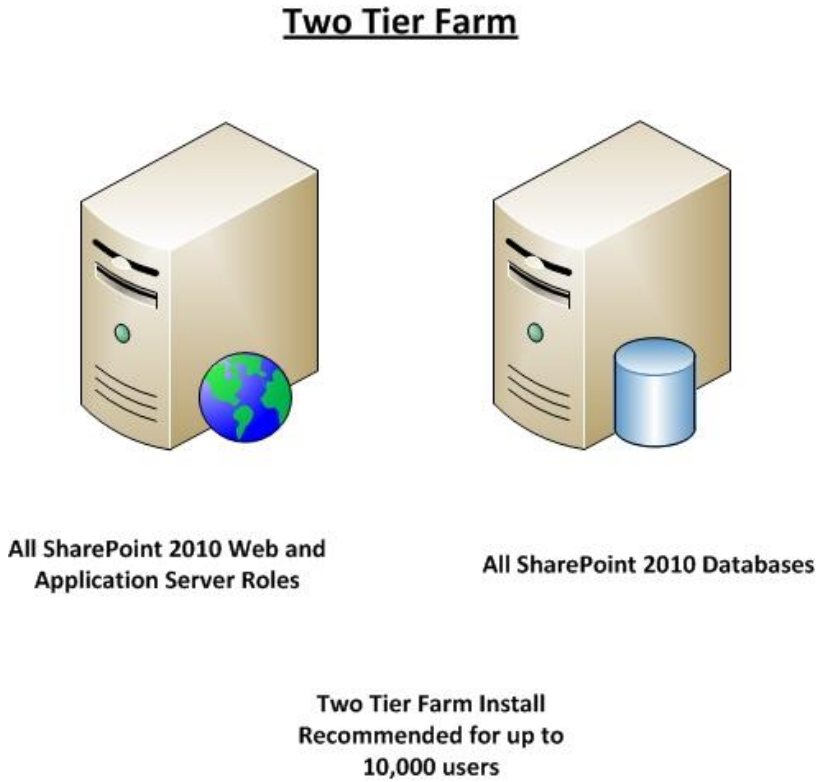
- Communicate **directly** with database
  - Local application front-end communicating with SQL Server
    - Even an Excel import of SQL data counts as single-tier



N-Tier

Multiple levels (n-levels) of communication
- Sharepoint server farm
  - Database server
  - Website server
  - (Two-tier)





Benefits of n-tier?

Change database without application logic
    (E.g., rewriting web server code)

Change front end (website) without messing with the database

Scalability
    Data distributed
    Application logic distributed

SQL Server Demo

1) Install SQL Server
2) Install something that uses SQL Server
3) ???
4) Profit!

https://elara.secs.oakland.edu/msdnaa/?action=signin

In-Class Work

Let's say that you wanted to use a **graph** database to track all of your IT infrastructure and assets

- What would a sample record look like?
  - Think: attributes, relationships, etc.

Create 3 different entries for:

1) An employee
2) A conference room
3) A server

Exchange Server

Quite possible to use IIS with an SMTP module
- ...but what fun is that

Exchange is our email application server
- Supports several protocols
  - SMTP, POP3, etc.

- But, only enable those protocols that your clients use!
  - Reduce attack surface
  - Also, make life easier on yourself (less to manage)

Protocols

Simple Mail Transport Protocol (SMTP)
- Most widely used email *transmission*
- Port 25

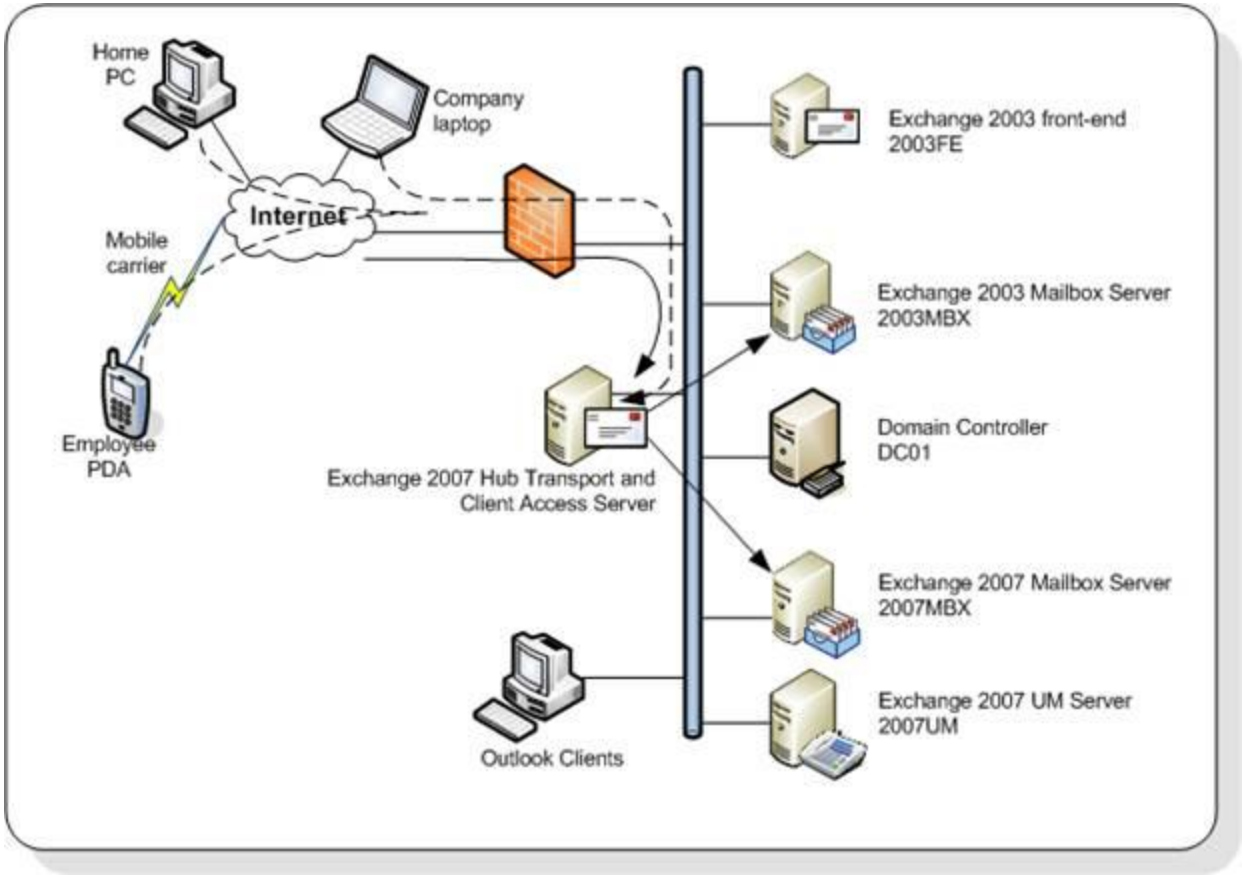
Post Office Protocol v3 (POP3)
- Downloads email, Port 110

Internet Message Access Protocol (IMAP)
- Leaves on server, Port 143
- Generally recommended

Messaging Application Programming Interface (MAPI)
- Communicate between Exchange server and Outlook (dynamic ports)

Exchange Server Roles

Hub transport	Move email around organization (**at least 1 required**)
Client access	Provides inboxes to clients (**at least 1 required**)
Unified messaging	Voicemail, fax, email into Exchange (*optional*)
Mailbox	Contains actual user mailboxes and data Multiple servers / database availability groups (DAGs)
Edge transport	Connects to outside world Should not be a part of AD domain
Management tools	Management consoles on various roles

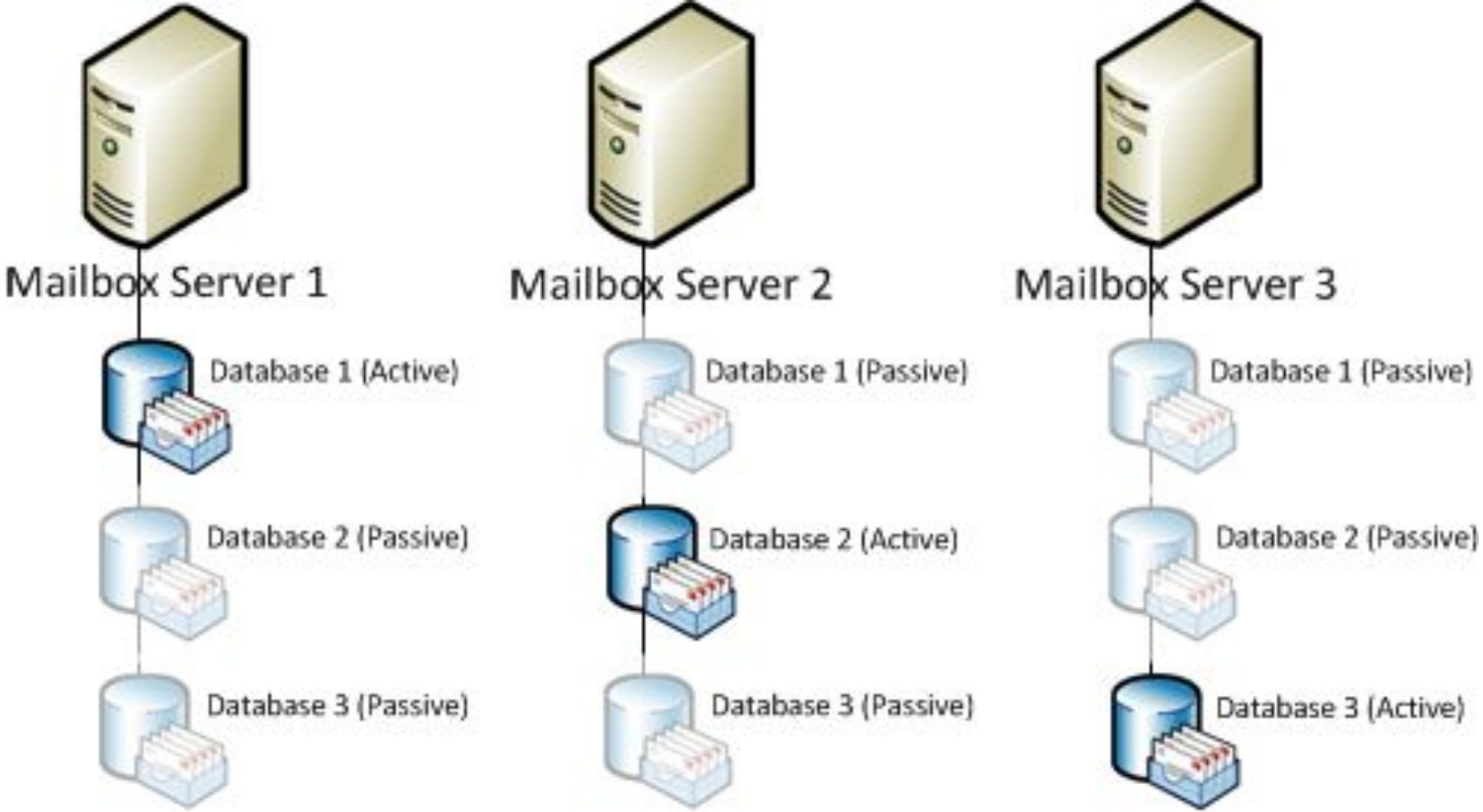

Home PC
Company laptop
Internet
Mobile carrier
Employee PDA
Exchange 2007 Hub Transport and Client Access Server
Outlook Clients
Exchange 2003 front-end 2003FE
Exchange 2003 Mailbox Server 2003MBX
Domain Controller DC01
Exchange 2007 Mailbox Server 2007MBX
Exchange 2007 UM Server 2007UM


Day 2

Storage Architecture

Stored in databases
- Mailbox databases
- Public folder databases
- Can be part of DAG (database availability group)
  - Again, fault tolerance
    - Multiple DBs online
    - Access to nearest/quickest DB

- Transaction logs
- Stored as *.EDB files
  - Store on RAID or SAN


Mailbox Server 1
Database 1 (Active)
Database 2 (Passive)
Database 3 (Passive)
Mailbox Server 2
Database 1 (Passive)
Database 2 (Active)
Database 3 (Passive)
Mailbox Server 3
Database 1 (Passive)
Database 2 (Passive)
Database 3 (Active)

Mailbox Management

Mail recipients
- Outlook / Other clients
- Distribution lists
- Group mailboxes
- Conferences rooms
- Equipment
- ...

Recipient:
- Create account (AD)
- Create account mailbox (Exchange Management Console)

Mailbox Management

AD’s underlying schema updated once Exchange is installed

Allow AD ↔ Exchange information exchange

Collaboration Server

SharePoint is probably the biggest name in the game (industry-wise)
- Alternatives: Confluence (Atlassian), Google Drive, etc.,

What is it?
- Collection of services
- Multi-tier application
  - Needs SQL Server
  - Needs IIS Server

SharePoint

Often described as a content management system (CMS)

- Not just blogs, wikis, etc.

- But, is much more
  - External database/data source access
  - Calendaring functions
  - Discussion forums
  - File sharing
  - Search
  - MS Office integration
  - Business workflow automation
  - …

How is it used?

Intranet provisioning

- Intranet (internal) wikis, web pages, web services

Project management

- Task assignments, calendars, etc.

Document sharing

- Not only hosting, but data analysis (e.g., Excel workbooks)

Collaboration

- Forums, tasks, document libraries, etc.

https://www.youtube.com/watch?v=s12Jb5Z2xaE

https://www.youtube.com/watch?v=-0ofQsAwF2I

Monitoring Servers

Most server provide a service to the *user*

A monitoring server serves the *network*

Monitors other servers/network and triggers alerts

- Can also respond automatically

Example:

- Monitoring server monitors available services
  - Service fails / doesn't respond
- Monitoring server triggers reboot on failing server
  - Notifies administrator

Monitoring Servers

System Center Virtual Machine Manager (SCVMM)
- Used with Hyper-V to monitor virtualization environment
- Automatic provisioning/reprovisioning
  - (Move a VM from one server to another)

System Center Operations Manager (SCOM)
- Monitors distributed services
- Notifies upon occurrence

System Center Data Protection Manager (DPM)
- Centralized backup solution (in background)
- Monitors for backup issues

Threat Management

Detect/prevent security attacks (Forefront servers -- discontinued and rebranded in 2015)

- Integrate with Exchange, SharePoint, etc.

HTTPS inspection

- Look for malware in SSL encrypted packets

Email security

- Scan email messages

Threat Management

Network inspection system (NIS)

- Scans network traffic for issues

Web malware detection

- Scans normal HTTP traffic for malware

VPN

- Create secure remote access connections