Queen Mary University of London

INTRODUCTION TO CLOUD APPLICATIONS

CLOUD COMPUTING

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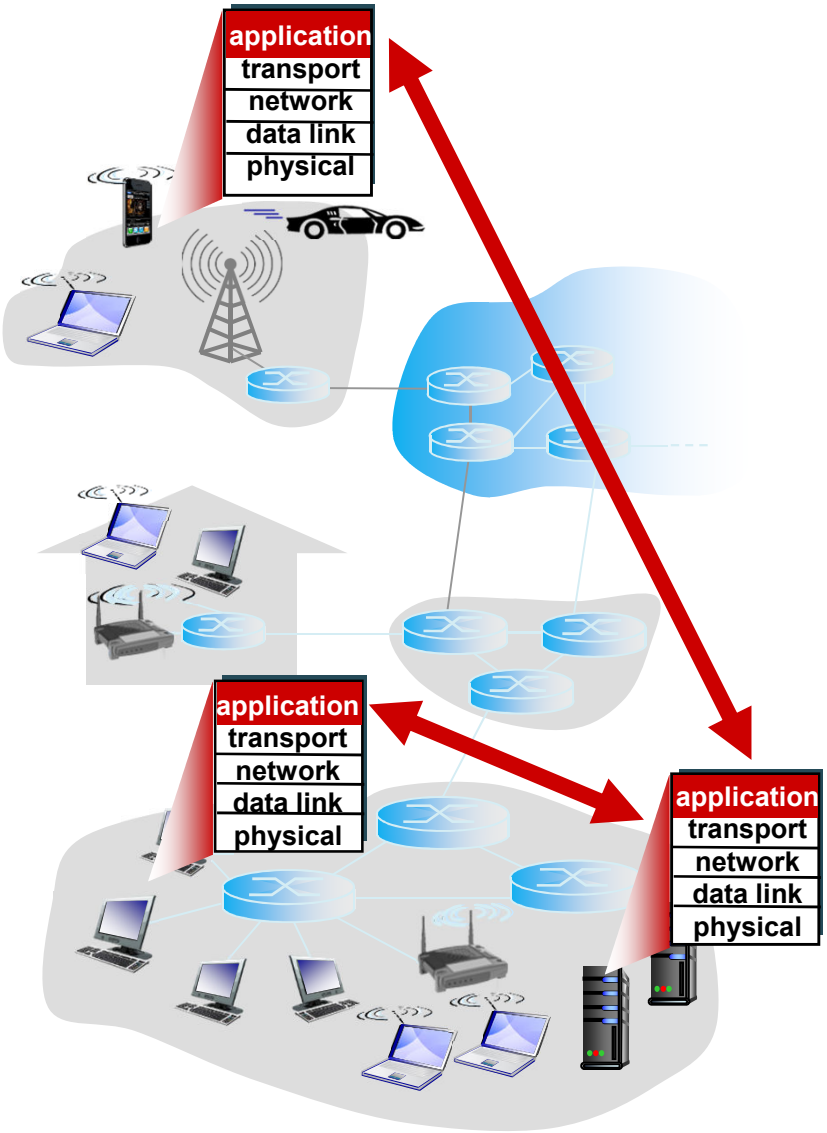
Contents

- **Intro to Cloud applications**
- Evolution of server-side applications
- REST Applications

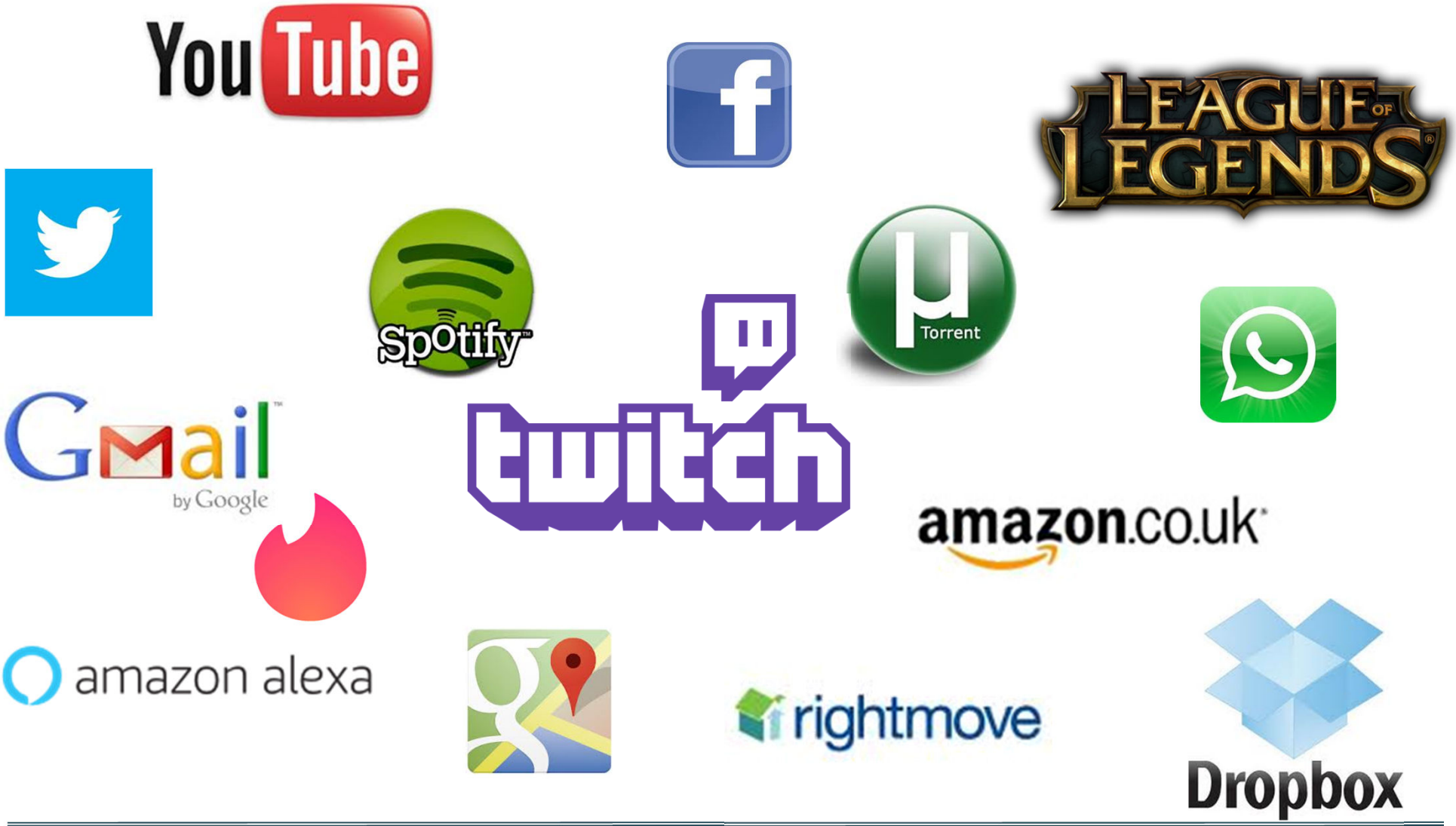
Networked applications

Programs that:

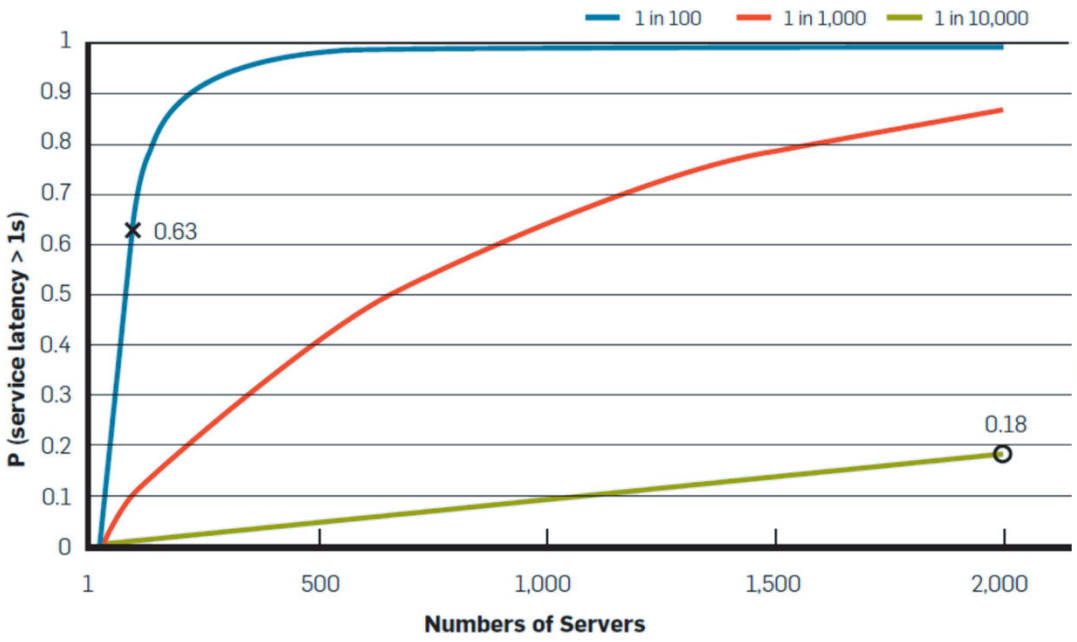
- run on (different) ***end systems***
- communicate over network
  - e.g., web server software communicates with mobile browser software
- applications only on end systems
  - allows for rapid app development, propagation
- two main interaction types
  - client – server
  - peer to peer

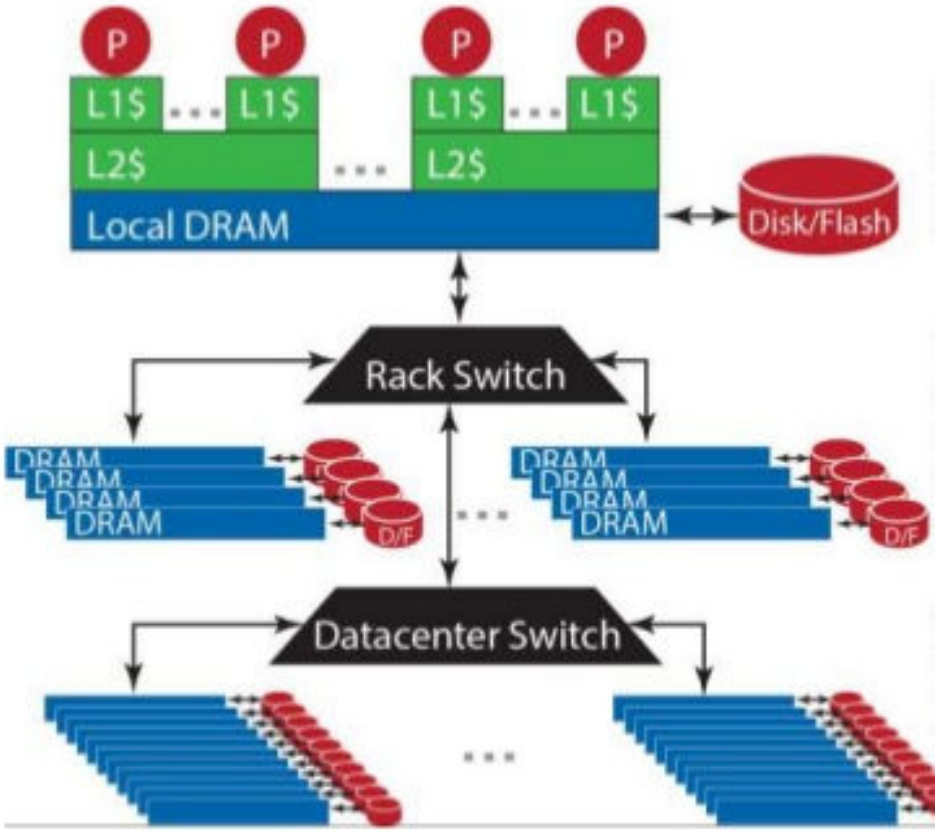


Some networked apps



Warehouse-scale Computing





J. Dean, D. Barroso, The tail at scale: CACM 2013

D. Barroso et al, The Datacenter as a Computer

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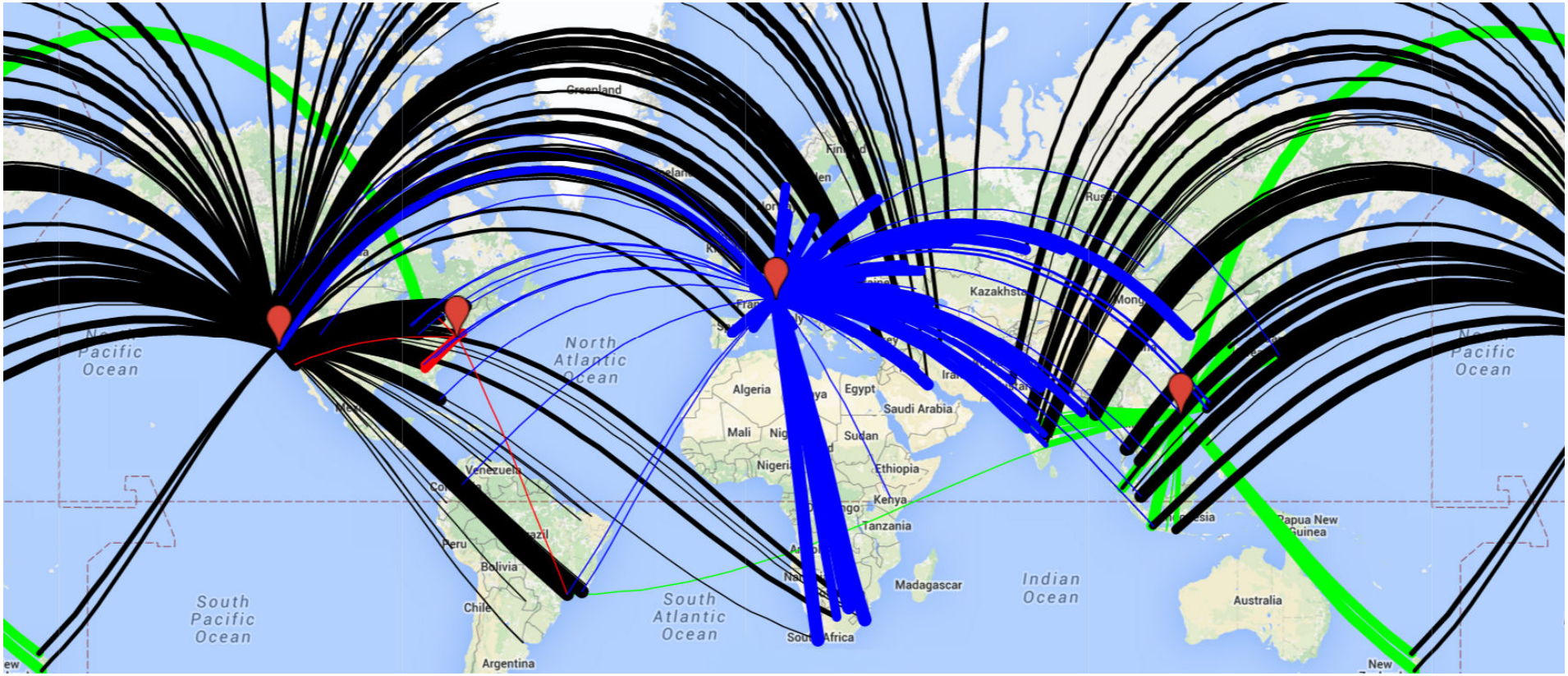
Geo-distributed applications



J. Deng et al, Internet scale user-generated live video streaming: The Twitch case. Proc. Of PAM 2017

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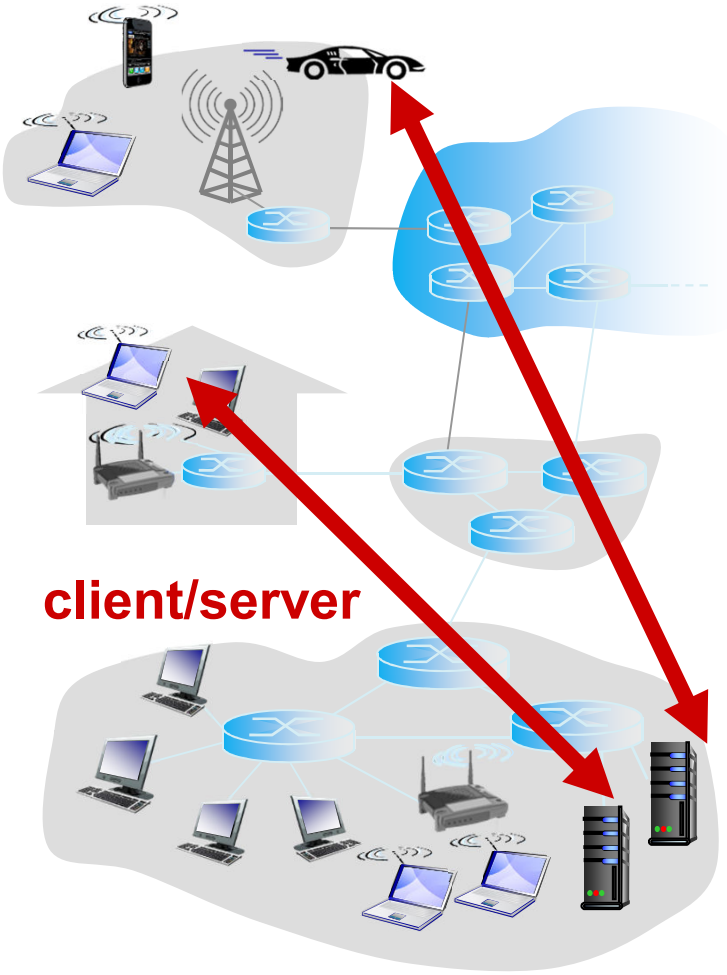
Client-server architecture

1 server:

- always-on host
- permanent IP address
- serves multiple clients
- data centres/cloud for scaling

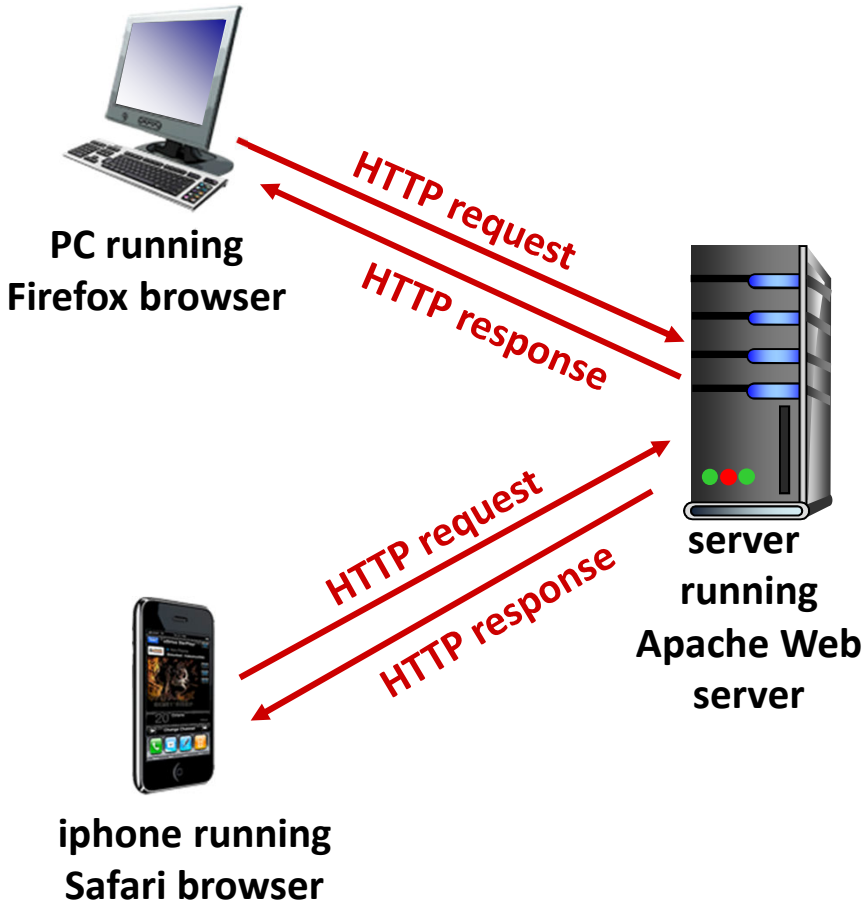


Many clients:

- communicate with server
- may be intermittently connected
- may have dynamic IP addresses
- do not communicate directly with each other

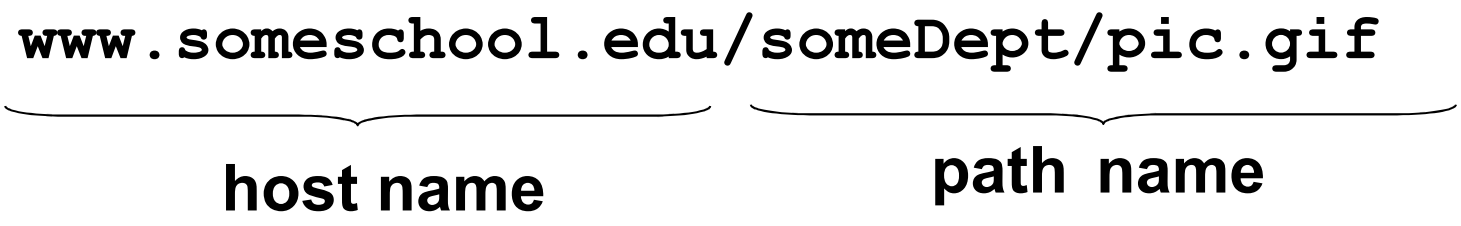
HTTP(hypertext transfer protocol)

- **THE** Web application layer protocol
- client/server model
  - *client:* browser? that requests, receives, (using HTTP protocol) and "displays" Web objects
  - *server:* Web server sends (using HTTP protocol) objects in response to requests



Web and HTTP

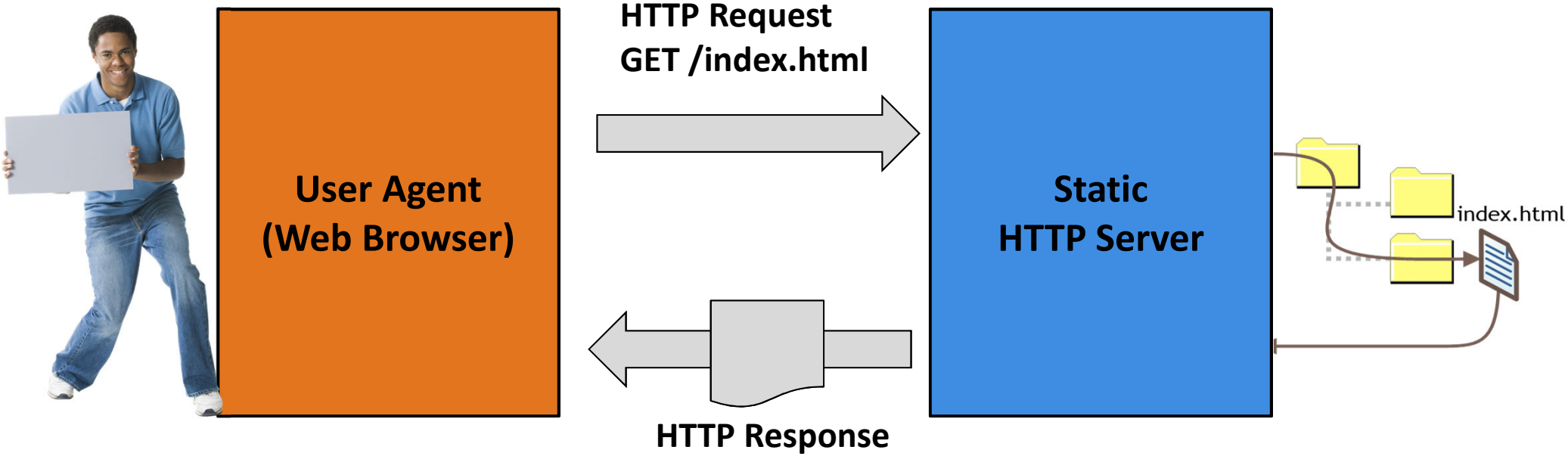
- **web page** consists of **objects**
- object can be HTML file, XML-Json data, js client-side code, JPEG image, audio file,…
- web page consists of **base HTML-file** which includes **several referenced objects**
- each object is addressable by a **URL**, e.g.,

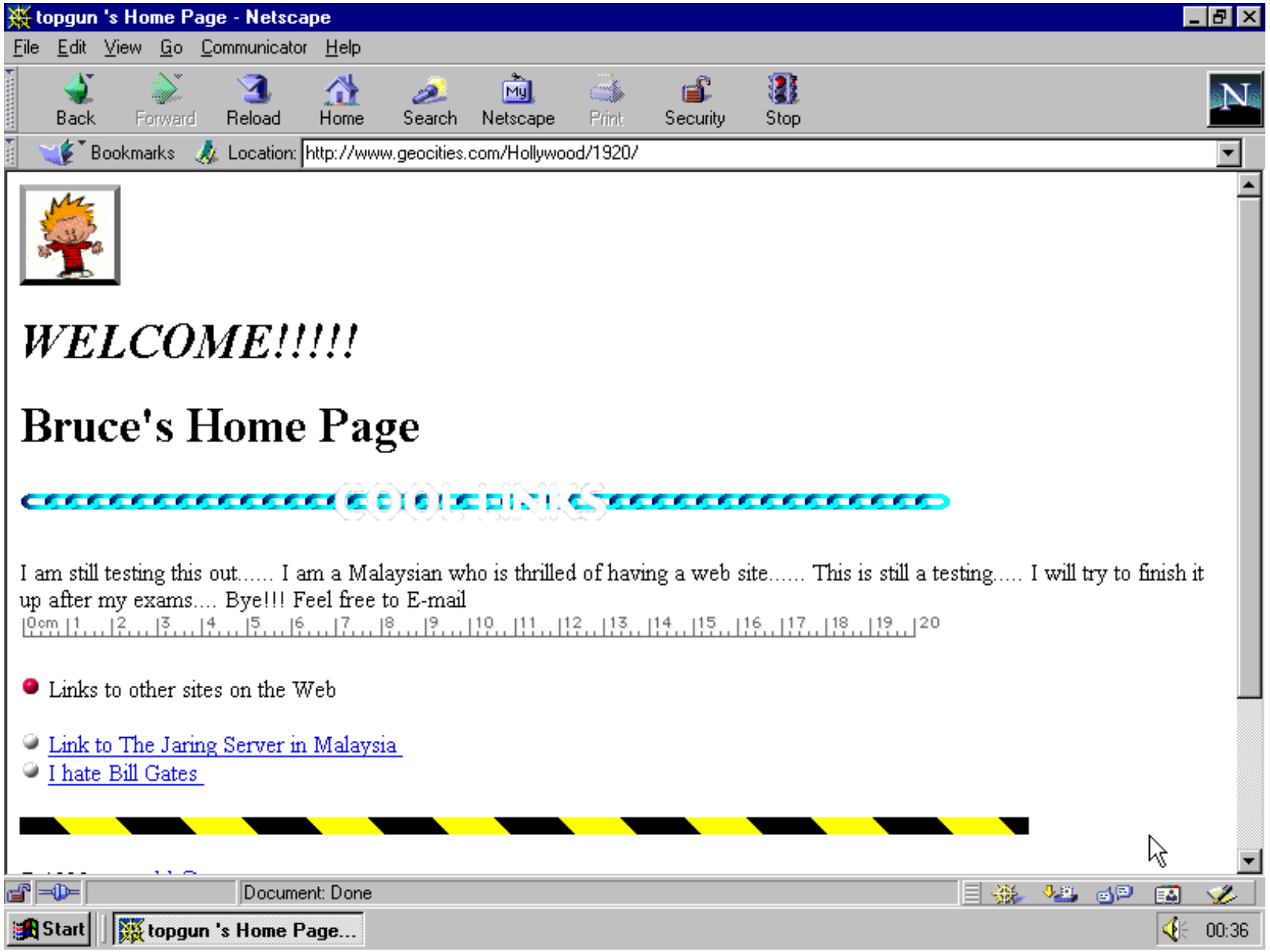


Web Server

- Web Server: application that serves content (HTML pages. images, applications) via HTTP protocol.
  - HTTP Protocol: Stateless, request - response
  - Plain text messages
  - Default TCP Port: 80
- Static Web Server (Apache)
  - Requests are addressed by locating and serving a stored static resource (html, jpeg, gif, pdf,…)

Static Web Server

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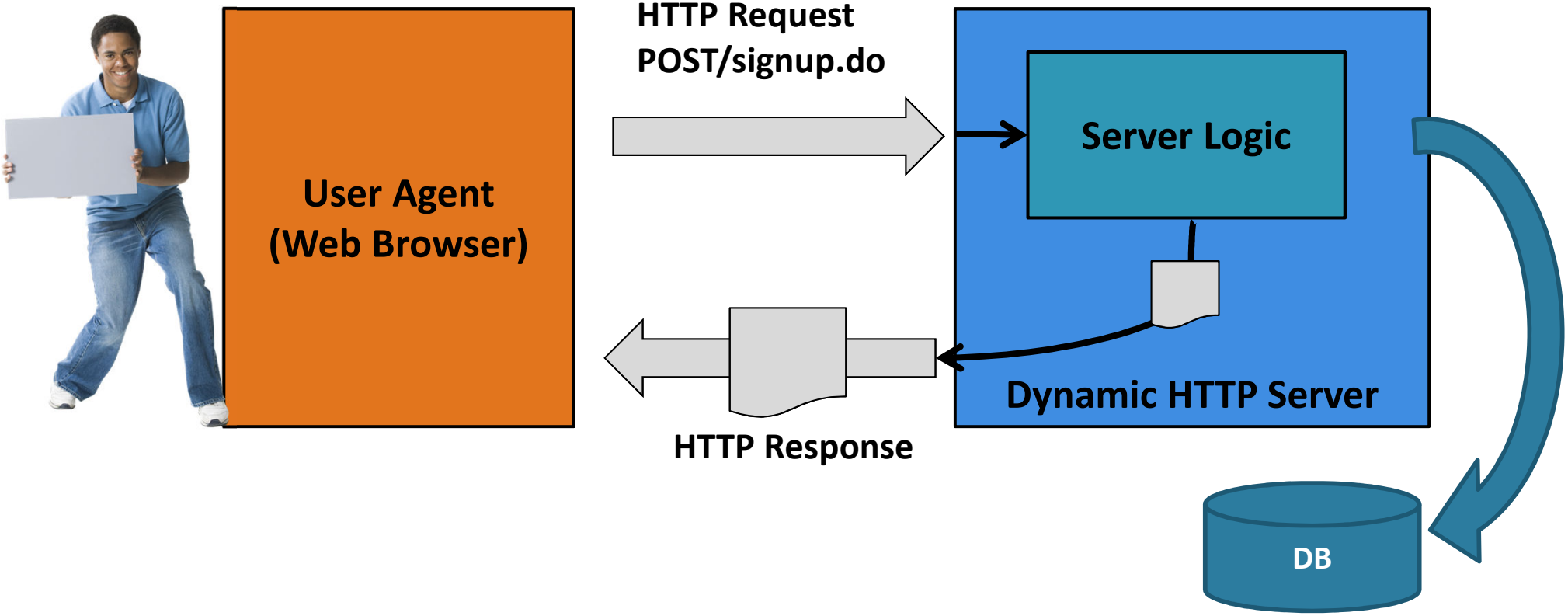
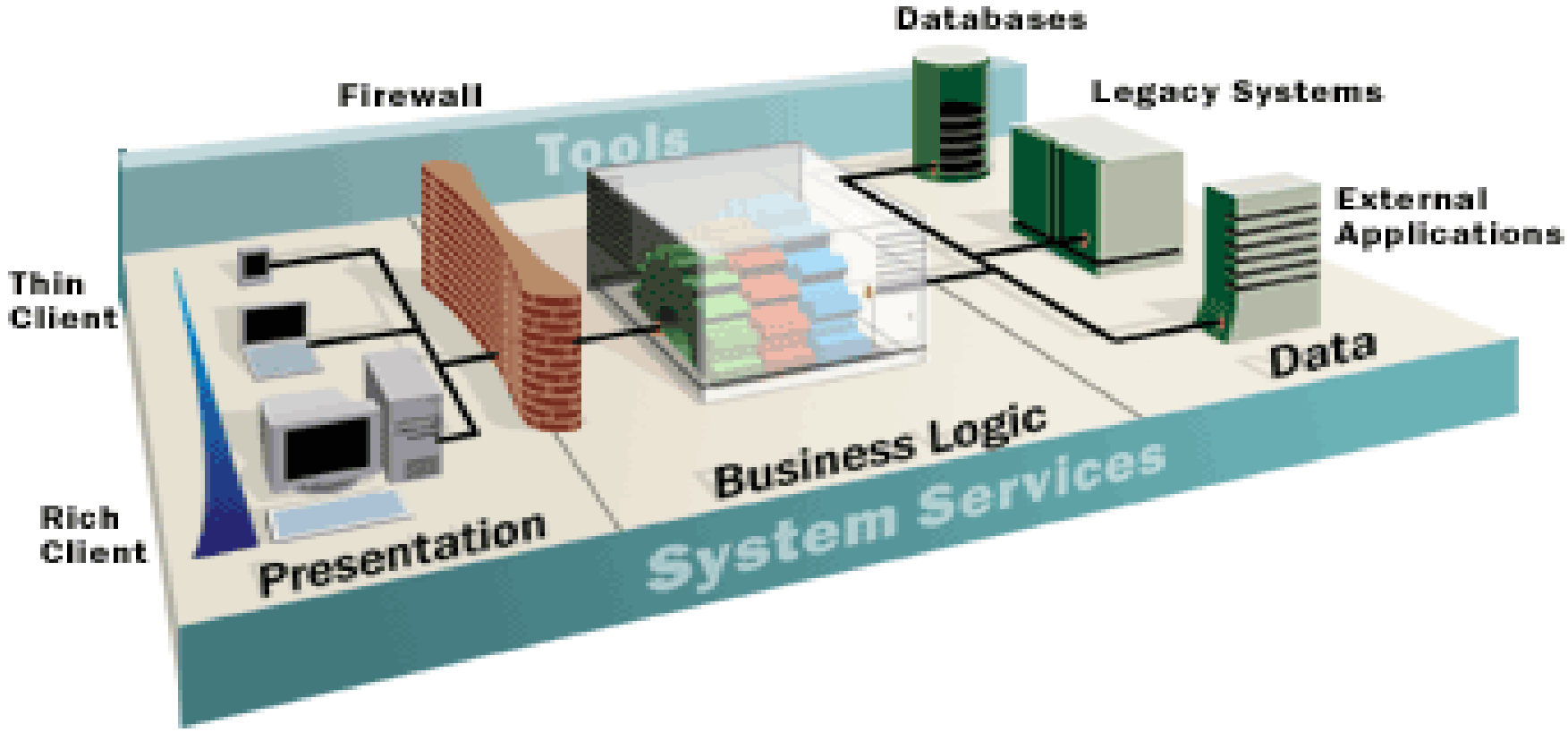
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Stop
Bookmarks Location: http://www.geocities.com/Hollywood/1920/
WELCOME!!!!!
Bruce's Home Page
I am still testing this out..... I am a Malaysian who is thrilled of having a web site..... This is still a testing..... I will try to finish it up after my exams.... Bye!!! Feel free to E-mail
Links to other sites on the Web
Link to The Jaring Server in Malaysia
I hate Bill Gates
Document: Done
Start
topgun 's Home Page...
00:36

Dynamic Web Server



The three-tier logical services architecture



Three tier logical server model (From JEE)

Presentation

- Handles user requests
- Controls navegation flows: MVC, sessions
- Creates the visual elements comprising the response

Business Logic

- Processes domain-specific information(domain objects)
- Keeps relationship between service elements
- Executes domain-specific functions

Data Access

- Automatic ORM (Object-Relational Mapping)
- Database communications
- Provides query functionality

Modern cloud applications

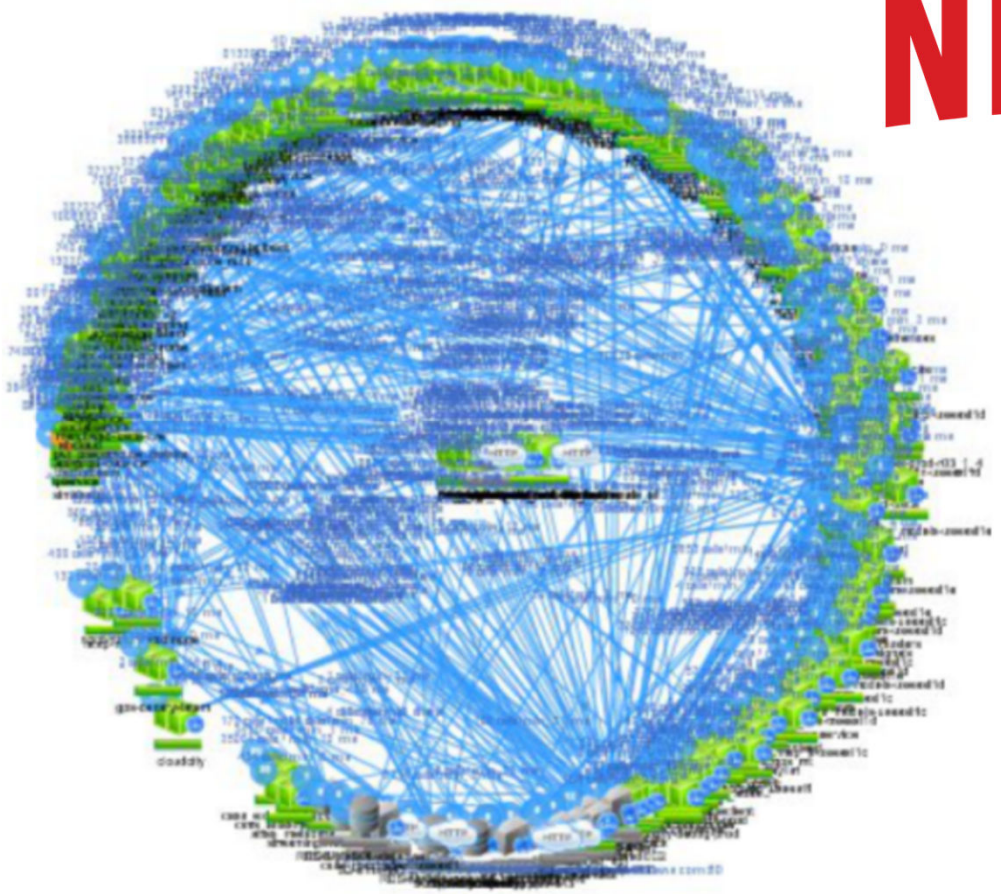
- Data-intensive
  - Analytics-infused and user experience-centric.
- Agile
  - Cloud infrastructure: elasticity, scale
  - Automated management
- Continuously integrated and delivered
  - Rapid evolution

Data-intensive applications

- Store data to find it later (*databases*)
- Periodically process large amounts of data (*batch processing*)
- Remember the result of expensive operation (*cache*)
- Send a message to another application, to be handled asynchronously (*stream processing*)

Modern Cloud Applications

NETFLIX



Cloud Applications topics

- Application communications: REST
- Cloud-scale data: distributed challenges
- Cloud data management
- Designing cloud applications: micro services
- The edge of the cloud: CDNs, IoT