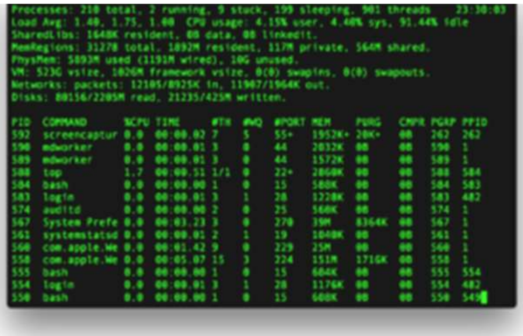
MODULE 2

Application Architecture and Introduction to Networks

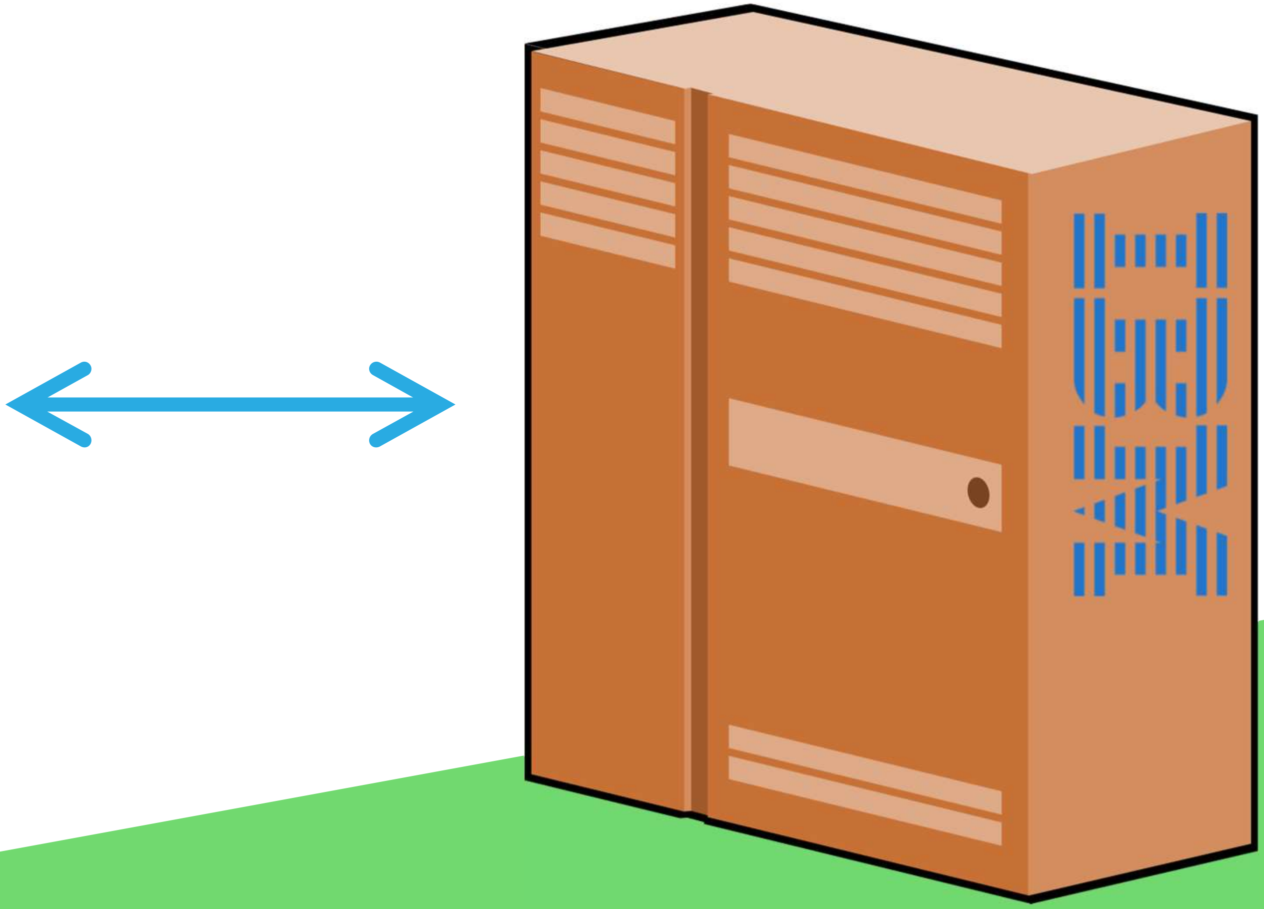
TECH ELEVATOR
A Stride Company

Before the PC Revolution



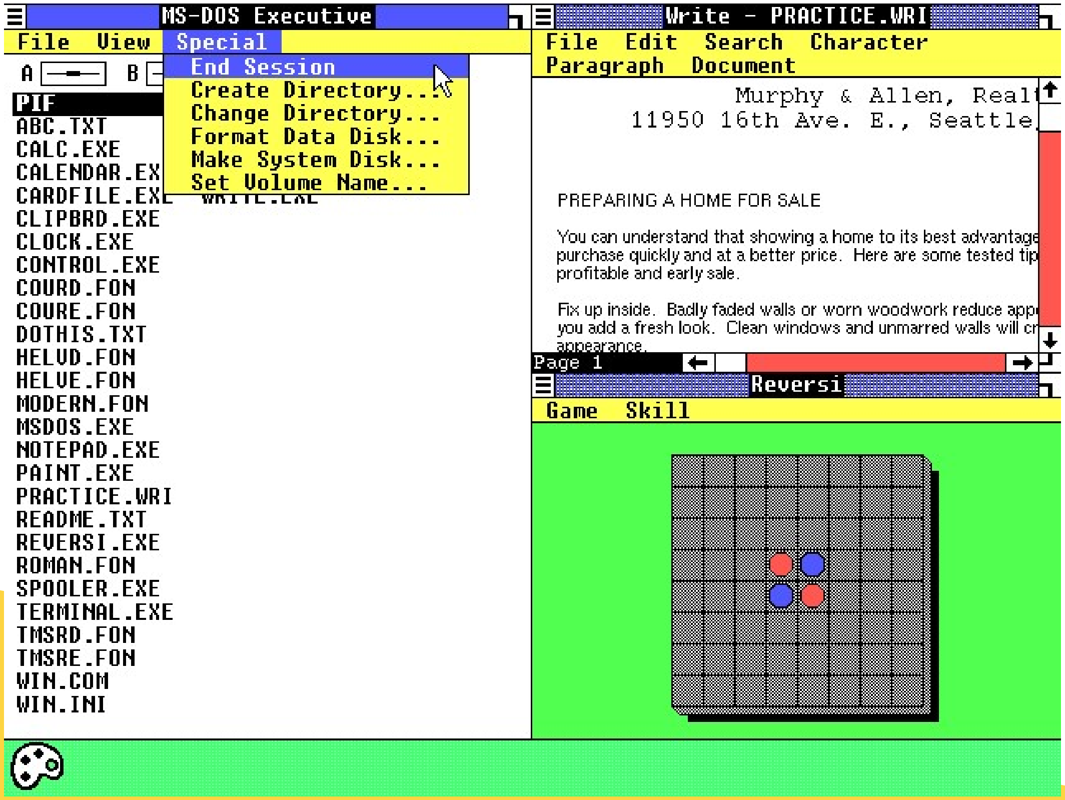
```
Processes: 210 total, 2 running, 9 stuck, 199 sleeping, 901 threads     23:30:03
Load Avg: 1.40, 1.75, 1.00  CPU usage: 4.15% user, 4.40% sys, 91.44% idle
SharedLibs: 1648K resident, 0B data, 0B linkedit.
MemRegions: 31278 total, 1092M resident, 117M private, 564M shared.
PhysMem: 5893M used (1191M wired), 10G unused.
VM: 523G vsize, 1026M framework vsize, 0(0) swapins, 0(0) swapouts.
Networks: packets: 12105/8925K in, 11907/1964K out.
Disks: 80156/2205M read, 21235/425M written.

PID  COMMAND      %CPU TIME     #TH  #WQ  #PORT MEM    PURG   CMPR PGRP PPID
592  screencaptur 0.0  00:00.02 7    5    55+   1952K+ 20K+   0B   262  262
590  mdworker     0.0  00:00.01 3    0    44    2032K  0B     0B   590  1
589  mdworker     0.0  00:00.01 3    0    44    1572K  0B     0B   589  1
588  top          1.7  00:00.51 1/1  0    22+   2860K  0B     0B   588  584
584  bash         0.0  00:00.00 1    0    15    580K   0B     0B   584  583
583  login        0.0  00:00.01 3    1    28    1220K  0B     0B   583  482
574  auditd       0.0  00:00.00 2    0    25    560K   0B     0B   574  1
567  System Prefe 0.0  00:03.23 3    0    270   39M    8364K  0B   567  1
561  systemstatsd 0.0  00:00.01 2    1    19    1040K  0B     0B   561  1
560  com.apple.We 0.0  00:01.42 9    0    229   25M    0B     0B   560  1
558  com.apple.We 0.0  00:05.07 15   3    224   151M   1716K  0B   558  1
555  bash         0.0  00:00.00 1    0    15    604K   0B     0B   555  554
554  login        0.0  00:00.01 3    1    28    1176K  0B     0B   554  482
550  bash         0.0  00:00.00 1    0    15    600K   0B     0B   550  549
```



PC Revolution!

GUI Revolution



Murphy & Allen, Realt
11950 16th Ave. E., Seattle

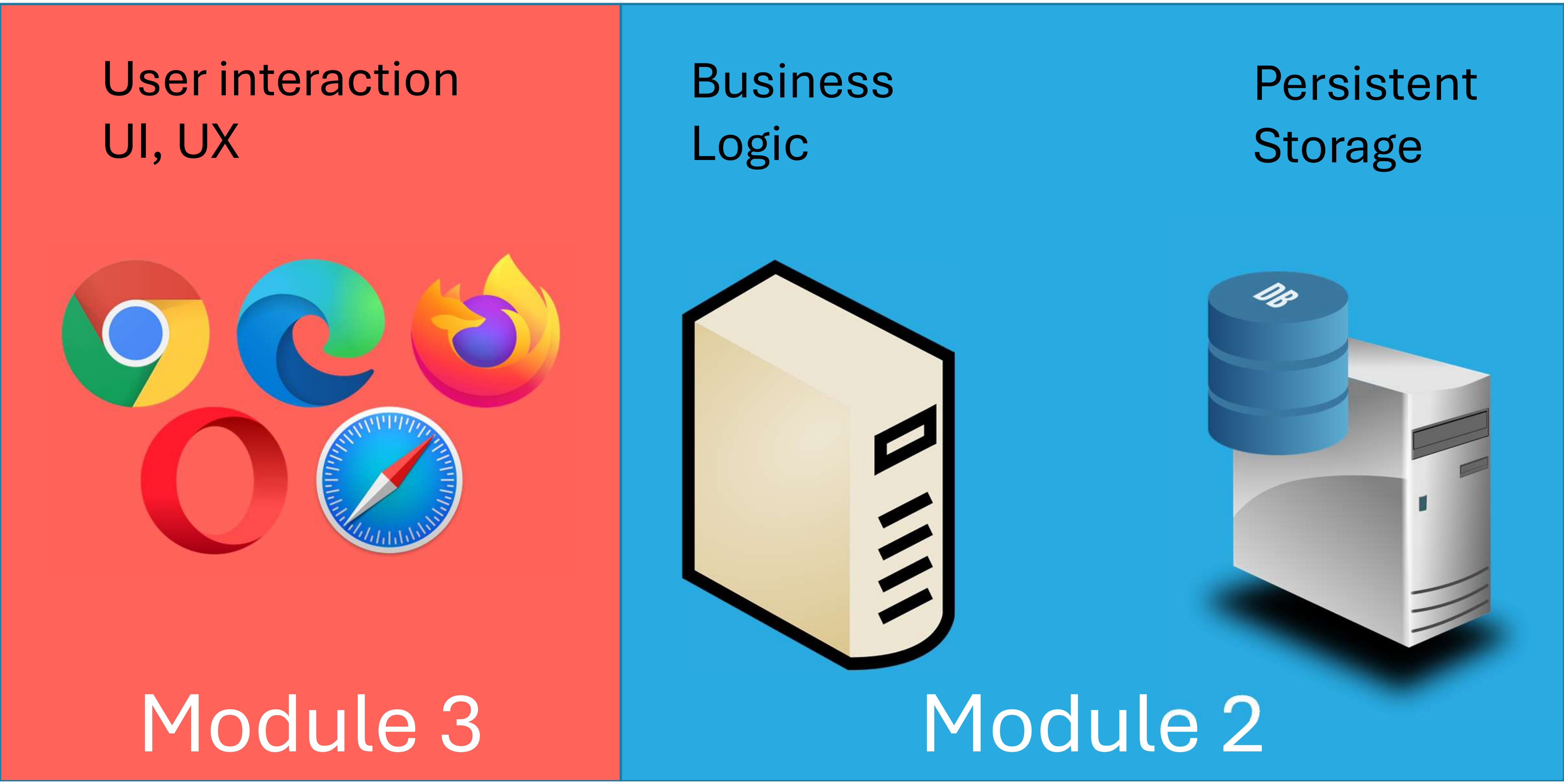
PREPARING A HOME FOR SALE

You can understand that showing a home to its best advantage
purchase quickly and at a better price. Here are some tested tip
profitable and early sale.

Fix up inside. Badly faded walls or worn woodwork reduce app
you add a fresh look. Clean windows and unmarred walls will cr
appearance.

Internet Revolution

Separation of Concerns



User interaction
UI, UX

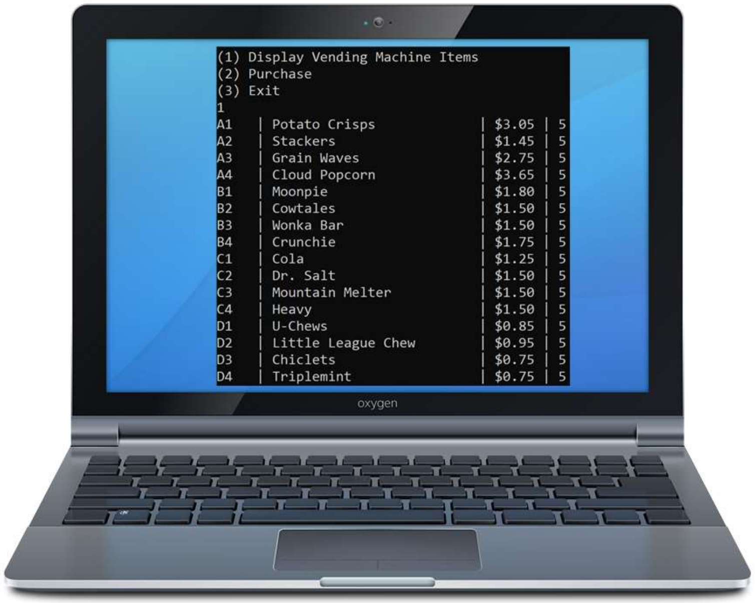
Business
Logic

Persistent
Storage

Module 3

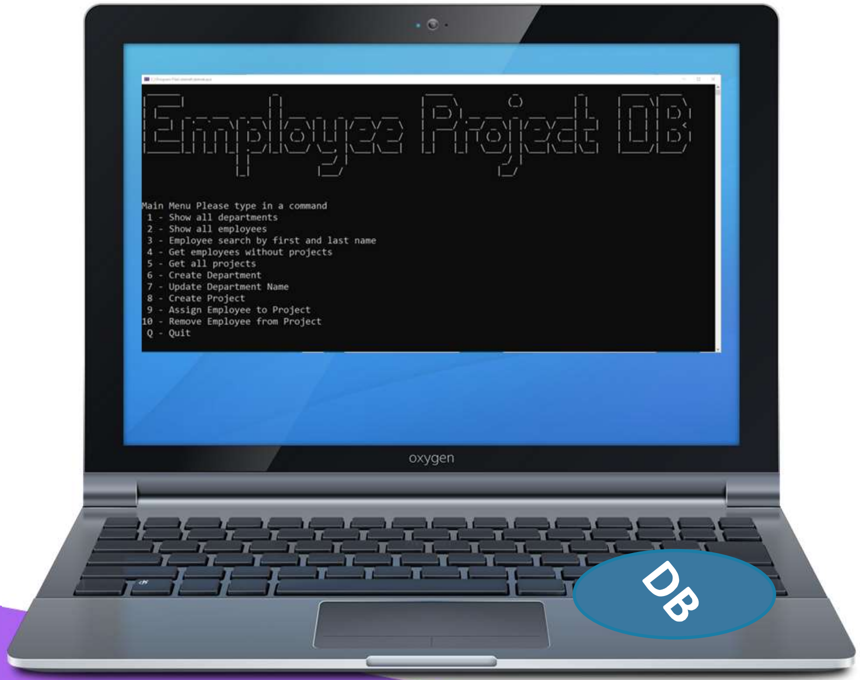
Module 2

Our Application Evolution



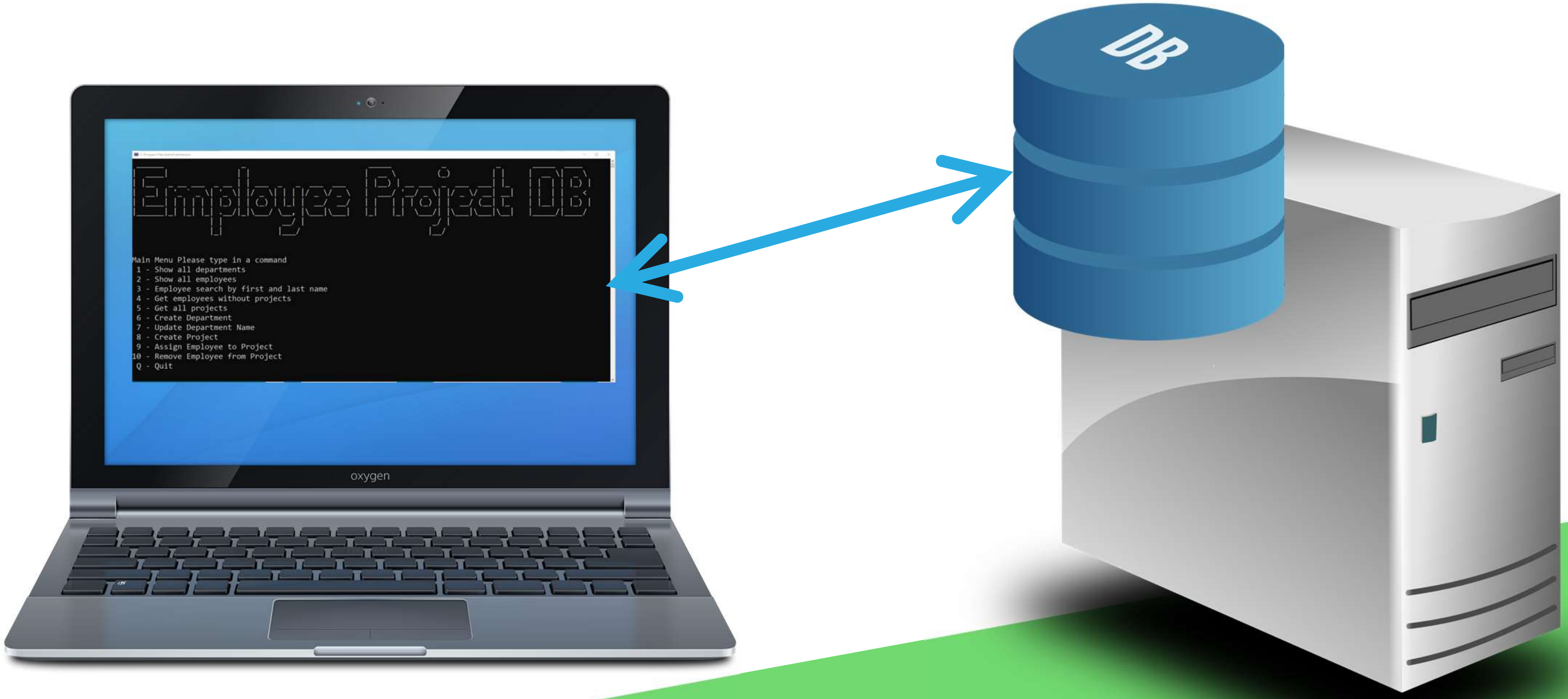
```
(1) Display Vending Machine Items
(2) Purchase
(3) Exit
1
A1    | Potato Crisps            | $3.05 | 5
A2    | Stackers                 | $1.45 | 5
A3    | Grain Waves              | $2.75 | 5
A4    | Cloud Popcorn            | $3.65 | 5
B1    | Moonpie                  | $1.80 | 5
B2    | Cowtales                 | $1.50 | 5
B3    | Wonka Bar                | $1.50 | 5
B4    | Crunchie                 | $1.75 | 5
C1    | Cola                     | $1.25 | 5
C2    | Dr. Salt                 | $1.50 | 5
C3    | Mountain Melter          | $1.50 | 5
C4    | Heavy                    | $1.50 | 5
D1    | U-Chews                  | $0.85 | 5
D2    | Little League Chew       | $0.95 | 5
D3    | Chiclets                 | $0.75 | 5
D4    | Triplemint               | $0.75 | 5
```

Our Application Evolution



```
Main Menu Please type in a command
 1 - Show all departments
 2 - Show all employees
 3 - Employee search by first and last name
 4 - Get employees without projects
 5 - Get all projects
 6 - Create Department
 7 - Update Department Name
 8 - Create Project
 9 - Assign Employee to Project
10 - Remove Employee from Project
 Q - Quit
```

Our Application Evolution



```
Employee Project DB

Main Menu Please type in a command
 1 - Show all departments
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```
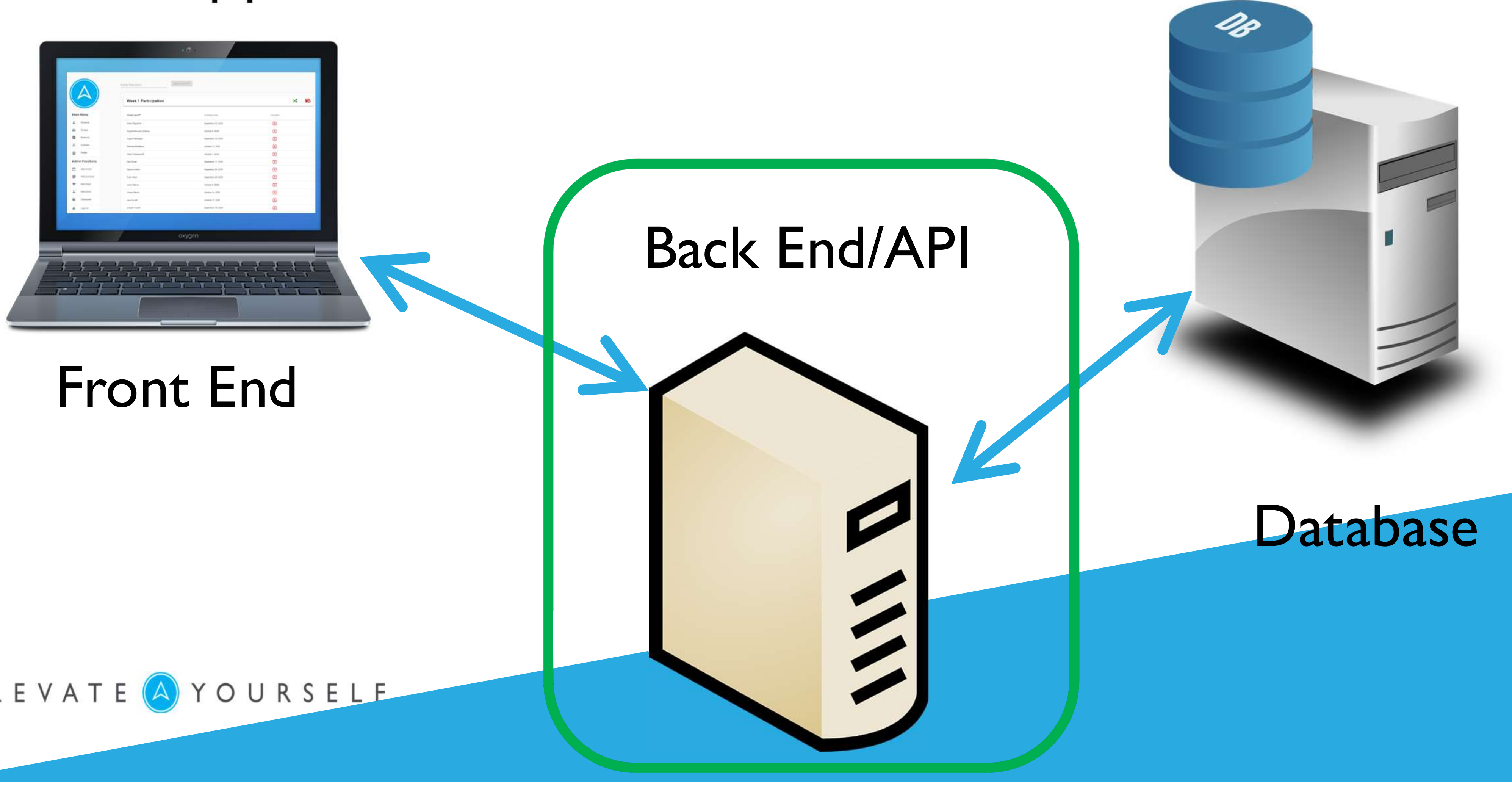

ELEVATE YOURSELF

Our Application Evolution

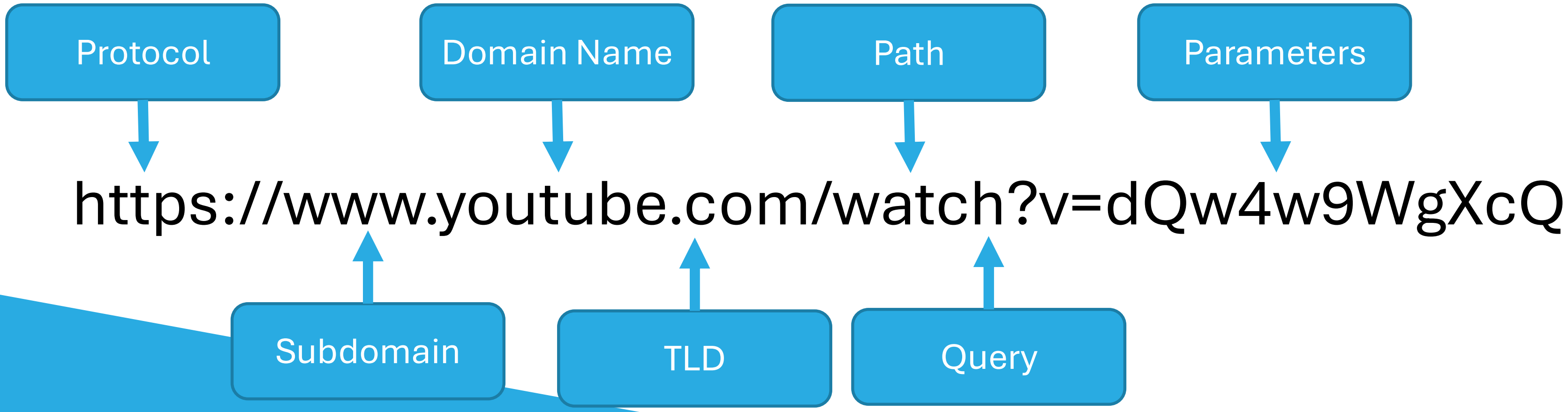


Internet

- Has anyone ever used the internet?

The URL

- What does URL stand for?
- Uniform Resource Locator



Protocol

Domain Name

Path

Parameters

https://www.youtube.com/watch?v=dQw4w9WgXcQ

Subdomain

TLD

Query

IP Address

- Internet Protocol Address (the phone number of the internet)
- Four numbers with 8 bits per number
  - 8 bits == 255 numbers
  - Example IPv4: 54.161.176.89
  - What’s your IP address?
- IPv4 is 32 bit allowing for 4.26 billion addresses.

IP Address

- Internet Protocol Address (the phone number of the internet)
- IPv4 is 32 bit allowing for 4.26 billion addresses.

Network Routers

ELEVATE YOURSELF

IPv6

- IPv6 is 128 bits allowing for 3.4*10^{38} addresses.
- Example of IPv6
    - fe80:0000:0000:0000:c0b5:30b7:3fd7:e2a4

Domain Name System

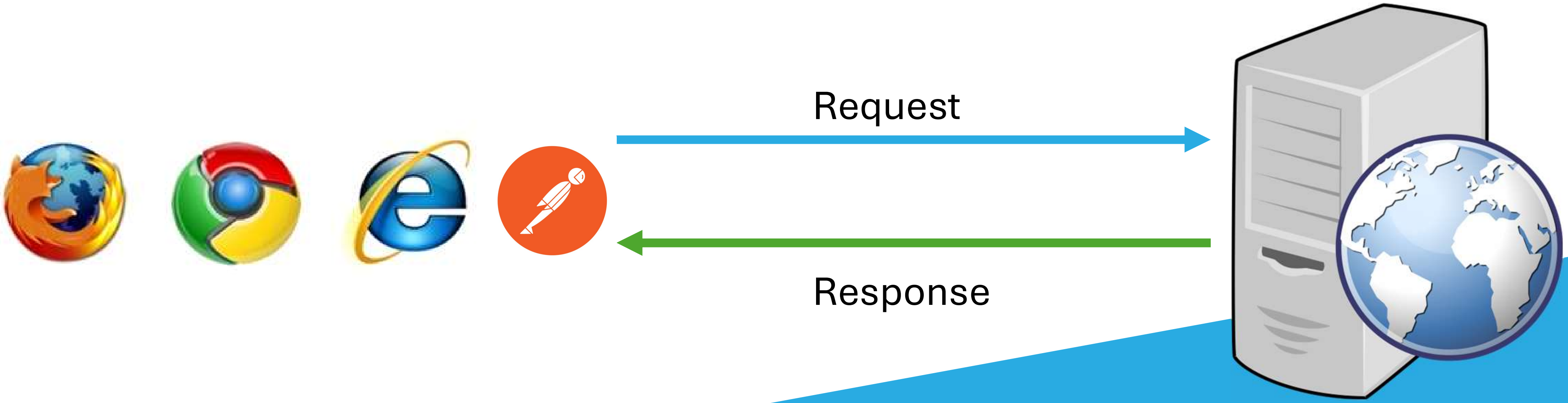
- DNS translates 198.185.159.144 to techelevator.com
- Start with the right most part of the domain: Top Level Domain:
  - .com
  - .net
  - .edu
- Next, is the domain name:
  - techelevator
  - espn
  - msn
- Then, the subdomain.
  - Each subdomain can point to a different IP

Port Numbers

- If IP addresses are your phone number, port numbers are the extension
- Range from 0 – 65535
- Common port numbers:
    - 80 == default http
    - 443 == default https
    - 25 == SMTP (email)
    - 21 == FTP

HTTP and HTTPS

- HTTP: Hypertext transfer protocol
  - How browsers and servers communicate with each other
  - Defines a simple request/response protocol



Request

Response

Key Elements of HTTP Request

- Method: GET, POST, PUT, DELETE, PATCH
- The page to access
- Form parameters

Querystring Parameters

- Querystring parameters allow us to add additional inputs.
- Parameters are represented in key/value pairs with the & symbol.

  https://www.google.com/search?**source=hp&ei=67uWX9noGMHF1QGr2KmwDw&q=techelevator&oq=techelevator**
- Anchor is a specific part of the resource and represents a bookmark in the document. Also abstracted by front end frameworks, much like the file path.

  http://www.yahoo.com#headlinenews

Key Elements of the Response Stream

- HTTP Status code
  - 1xx Informational
  - 2xx Success (200 OK)
  - 3xx Redirect (301 Moved Permanently)
  - 4xx Client Error (400 Bad Request, 401 Unauthorized, 403 Forbidden, 404 Not Found)
  - 5xx Server Error (500 Internal Server Error, 501 Not Implemented)

Response Data

- JSON (JavaScript Object Notation) is a lightweight data-interchange format.

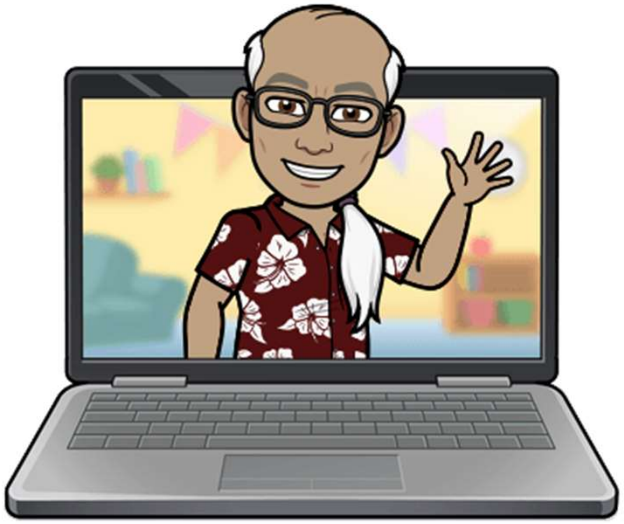
```
{
  "id": 1,
  "name": "Aloft Cleveland",
  "address": {
    "id": "69006b81-7f58-4acc-a10e-f9f87affae5f",
    "address": "1111 W 10th St",
    "address2": "",
    "city": "Cleveland",
    "state": "Ohio",
    "zip": "44113"
  },
  "stars": 3,
  "roomsAvailable": 48,
  "costPerNight": 274,
  "coverImage": "aloft-cleveland.webp"
}
```

JSON (JavaScript Object Notation)

- Key value pairs of data
- Numbers are not in quotes
- Keys are always strings and in double quotes
- Square brackets [ ] indicate arrays
- Curly brackets { } indicate objects

```
{
  "Title": "Scream",
  "Year": 1996,
  "Rated": "R",
  "Released": "20 Dec 1996",
  "Runtime": "111 min",
  "Genre": "Horror, Mystery",
"Plot": "A year after the murder of her mother, a teenage girl is
terrorized by a new killer, who targets the girl and her friends by
using horror films as part of a deadly game.",
"Ratings": [
    {
      "Source": "Internet Movie Database",
      "Value": "7.3/10"
    },
    {
      "Source": "Rotten Tomatoes",
      "Value": "79%"
    },
    {
      "Source": "Metacritic",
      "Value": "65/100"
    }
  ],
```

LET’S CODE!



Web Server vs Application Server

- Web Servers are good for serving up web resources that are static content
- Application Servers are for generating dynamic web pages
  - IIS, Tomcat, Apache

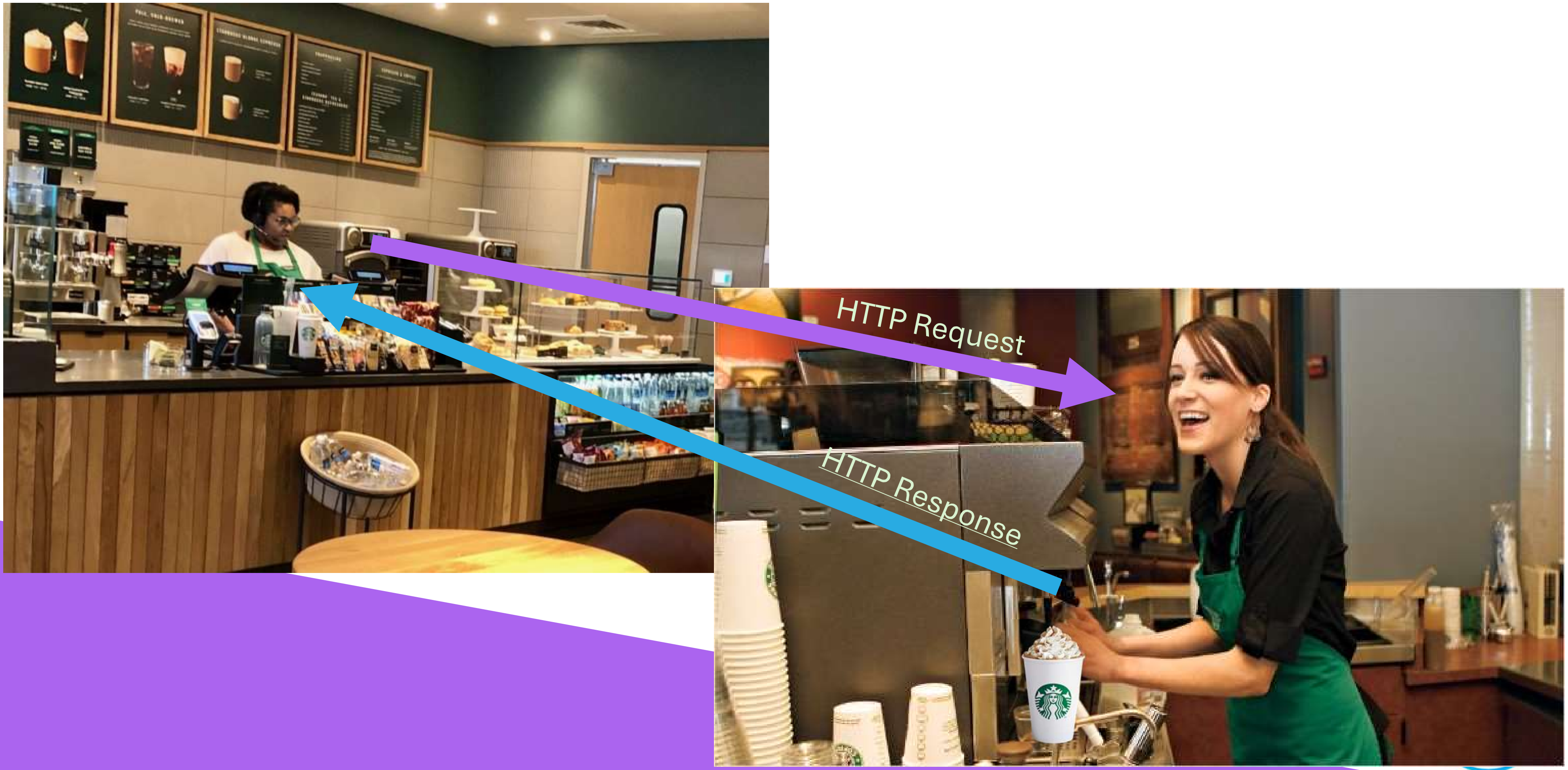
Registering Your Own Domain

- A domain name can be leased from a DNS Registrar.
    - Popular and easy to use registrars are godaddy.com, hover.com or Google's domains.google.
- What you lease is a subdomain of the TLD you choose.
    - Tech Elevator leases the domain techelevator.com.
- You create the subdomains…as many as you like.

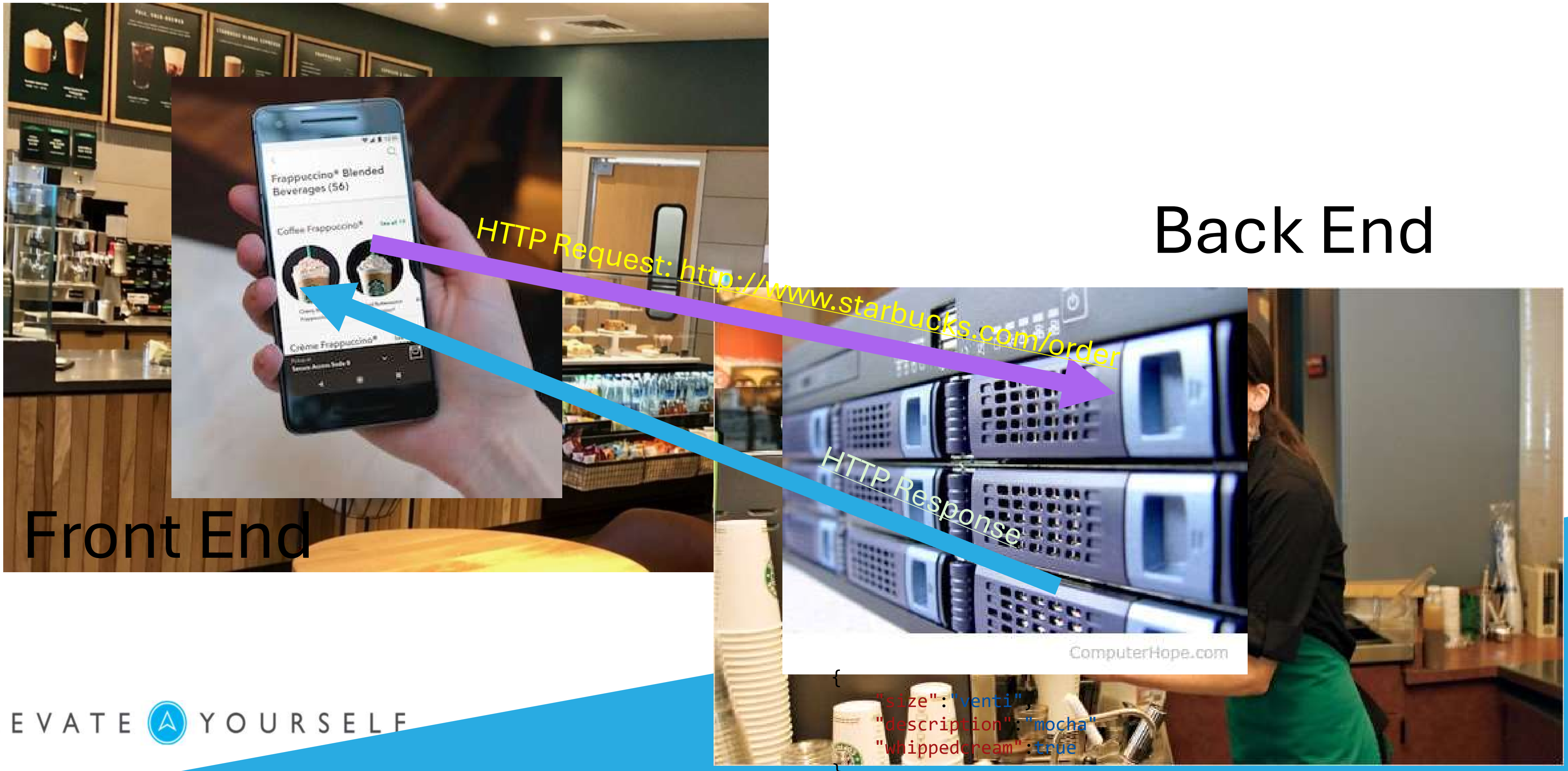
WHAT QUESTIONS DO YOU HAVE?

Let’s get some coffee!

Coffee process



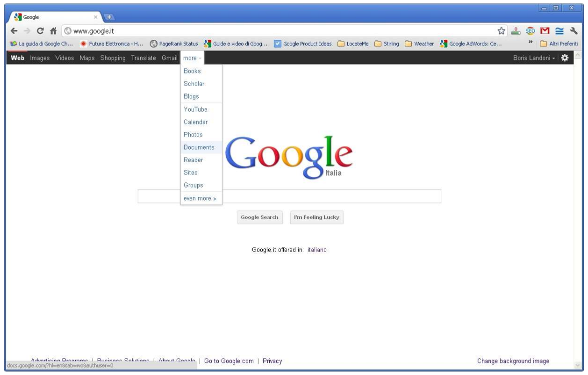
Coffee process

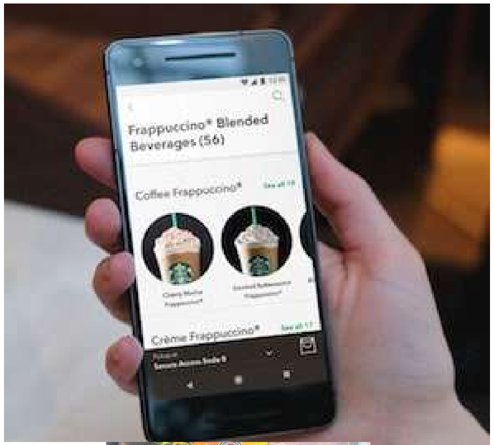


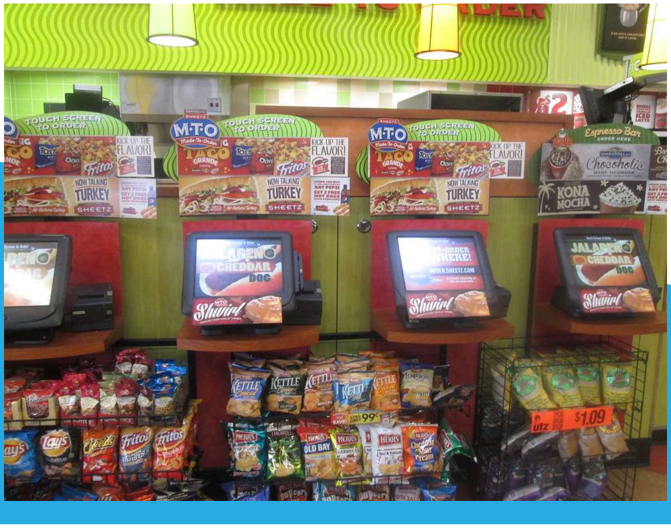
```
{
    "size":"venti",
    "description":"mocha"
    "whippedcream":true
}
```

Front Ends – You’ve used

- Web Browser
- Mobile App
- ATM Machine
- Sheetz MTO Kiosk
- Gas Pump





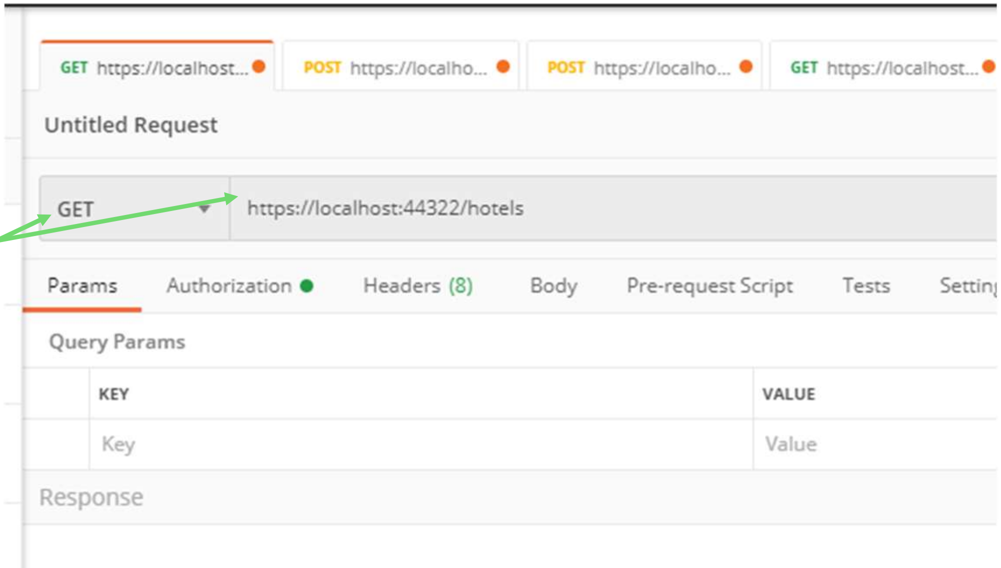


Front End Needs

- How to talk to the back end
  - Client
- Reference to Back End
  - URL (end point)
- Method (or verb)
  - HttpGet – retrieve information
  - HttpPost – add information
  - HttpPut – update information
  - HttpDelete – delete information

Front End Needs – Postman

- How to talk to the back end
  - Client
- Reference to Back End
  - URL (end point)
- Method (or verb)
  - HttpGet – retrieve information
  - HttpPost – add information
  - HttpPut – update information
  - HttpDelete – delete information



GET https://localhost... POST https://localho... POST https://localho... GET https://localhost...

Untitled Request

GET https://localhost:44322/hotels

Params Authorization ● Headers (8) Body Pre-request Script Tests Settin

Query Params

KEY	VALUE
Key	Value

Response

Consumer of API– Code

- How to talk to the back end
  - Client
- Reference to Back End
  - URL (end point)
- Method (or verb)
  - HttpGet – retrieve information

- RestClient
  - get() *sets up a GET request*
    .uri(String) *sets the endpoint*
    .retrieve() *sends the GET request*
    .body(Class) *extracts the Body*

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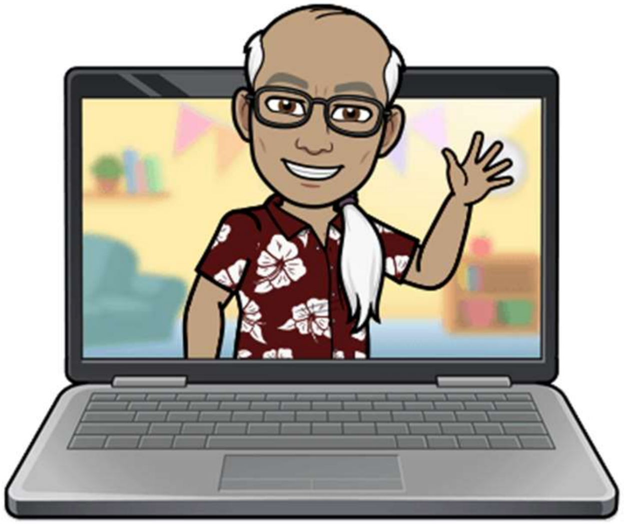
Hotel reservation server

- https://te-pgh-api.azurewebsites.net/api/hotels

ELEVATE YOURSELF

LET’S CODE!



WHAT QUESTIONS DO YOU HAVE?

Reading for tonight:

Consuming Web APIs (POST, PUT, DELETE)