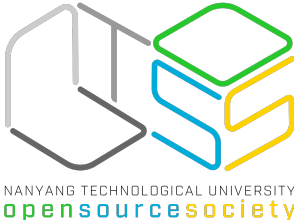
Public Version 1.1



Introduction to **API Development**

Jay Gupta, Computer Science Year 4
NTUOSS TGIFHacks #131

February 11, 2022
AY2021-22 Semester 2

Version 1.1

Agenda

- Introduction
- API Examples
- Types
- Web API Protocols
- REST & RESTful
- Programming Exercise
- Request Methods
- Parameters
- Status Codes
- Remarks

Questions & Queries

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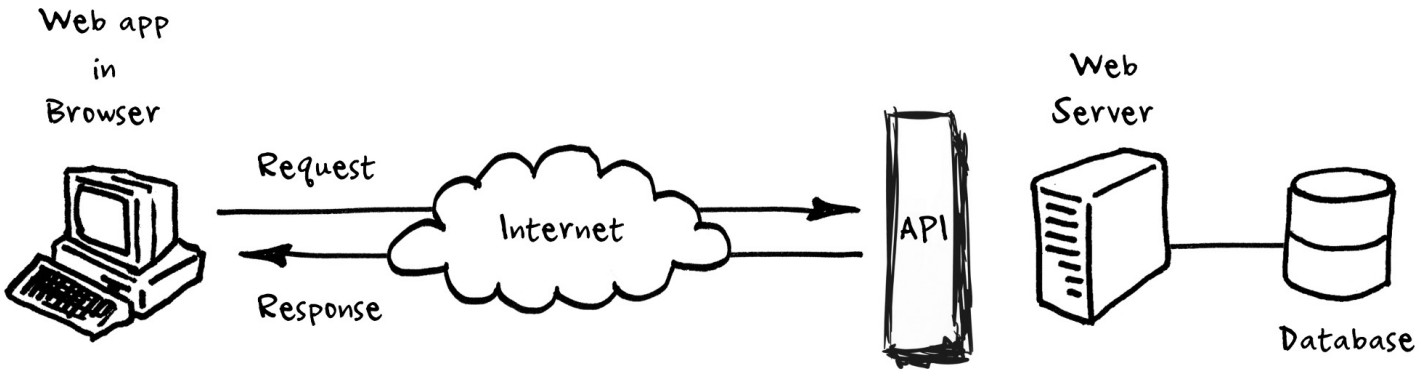
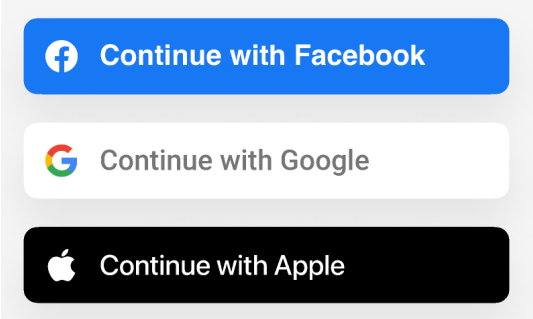
NTUOSSAPI

Application Programming **Interface**

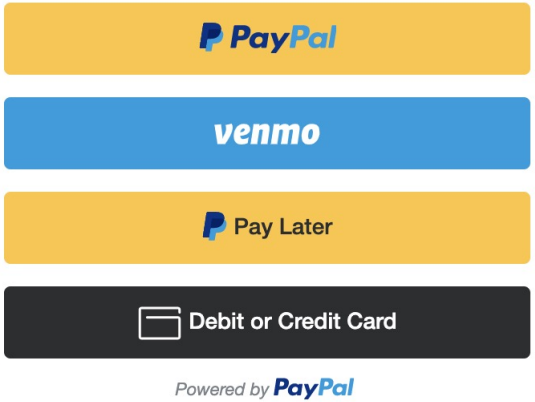


Source: https://www.smashingmagazine.com/2019/01/api-based-platforms-product-managers/

API Examples



Universal Logins



Third-party Payment Processing

Types of APIs

Framework APIs

Interface to a software library

Example

Operating System APIs

Interface between an application and the OS

Example

Remote APIs

Interface between resources through a communication network

Example

Web APIs

Interface for the Web

Example

Web API Protocols

Remote Procedure Call

XML-RPC	SOAP	JSON-RPC
Encoding: XML **Transport**: HTTP	**Encoding**: XML **Transport**: SMTP, HTTP	**Encoding**: JSON **Transport**: HTTP, sockets, etc.
	No longer actively used	Ethereum Virtual Machine *

* https://github.com/ethereum/execution-apis

Web API Protocols

RESTful

Encoding: JSON, HTML, Text, etc.
Transport: HTTP

Global Standard

GraphQL

Encoding: Schema Definition Language (SDL) (Request), JSON (Response)
Transport: HTTP

New & Upcoming

REST & **REST**ful?
Representational **S**tate **T**ransfer

Uniform Interface

Client-Server Decoupling

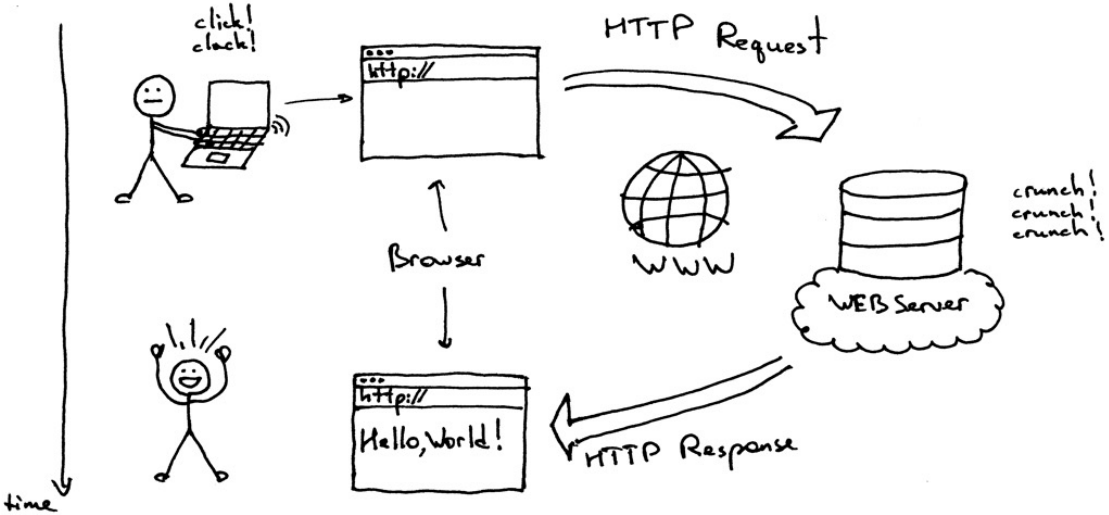
Stateless Communication

Cacheable Data

Layered System

Code-on-Demand (Optional)

Client – Server Architecture



Source: https://hackernoon.com/http-made-easy-understanding-the-web-client-server-communication-yz783vg3

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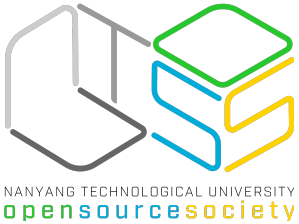
Programming Exercise – NTUOSS API



Student

Name
School
Graduation Year

NTUOSS Website/Mobile App

Register new users and display the list of members

Version 1.1

Programming Exercise

github.com/guptajay/NTUOSS-API-Development-Workshop

HTTP **Request** Methods

GET	Request for a Resource
POST	Submit a Resource
PUT	Edit a Resource
DELETE	Delete a Resource

HEAD

TRACE

PATCH

CONNECT

OPTIONS

More Detail: https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods

Path vs Query Parameters

GET

api.ntuoss.com

/members/{id}

Identify a Resource

Path vs Query Parameters

GET

api.ntuoss.com

/members?school=scse

Filter/Sort Resources

Version 1.1

HTTP **Response** Status Codes

1XX	Informational
2XX	Success
3XX	Redirection
4XX	Client Error
5XX	Server Error

- 200 OK
- 400 Bad Request
- 401 Unauthorized
- 403 Forbidden
- 404 Not Found
- 500 Server Error
- 502 Bad Gateway

More Detail: https://developer.mozilla.org/en-US/docs/Web/HTTP/Status

Remarks

- APIs form the backbone of most applications since they are useful in decoupling the front-end and back-end components and serve as a connection between them.
- They are essentially messengers that take requests from one entity, process it, and return the response for the request.
- The requester does not need to know any details about how the request is processed and returned.
- If you are keen to know more about APIs, I highly recommend learning **Spring Boot** (JAVA/Kotlin) for enterprise software development, or **Flask/FastAPI** (Python) for ML-based application use-cases.

Part 2 of this Workshop

Security (Authentication/Encryption)

API Specifications & Standards (e.g., OData)

CORS

Deployment

CI/CD Pipelines & Testing

. . .

Next Friday

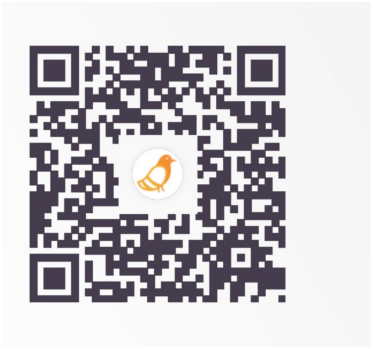
18 Feb.

1830 – 2030 hrs

Beyond this Workshop

- RESTful API Fundamentals & Usage
- RESTful API Development –
  - Kotlin – Spring Boot
  - JAVA – Spring Boot
  - Python – FastAPI
  - Python – Flask
- GraphQL API Development

Thank you. **Questions?**



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References*

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- https://codingnomads.co/blog/python-fastapi-tutorial
- https://github.com/craigsdennis/intro-to-apis-course/blob/master/course-notes.md
- https://en.wikipedia.org/wiki/API
- https://developer.mozilla.org/en-US/docs/Web
- https://www.redhat.com/en/topics/api/what-is-a-rest-api
- https://graphql.org/
- https://www.ibm.com/cloud/learn/api

* This is not an exhaustive list of references used for this workshop.