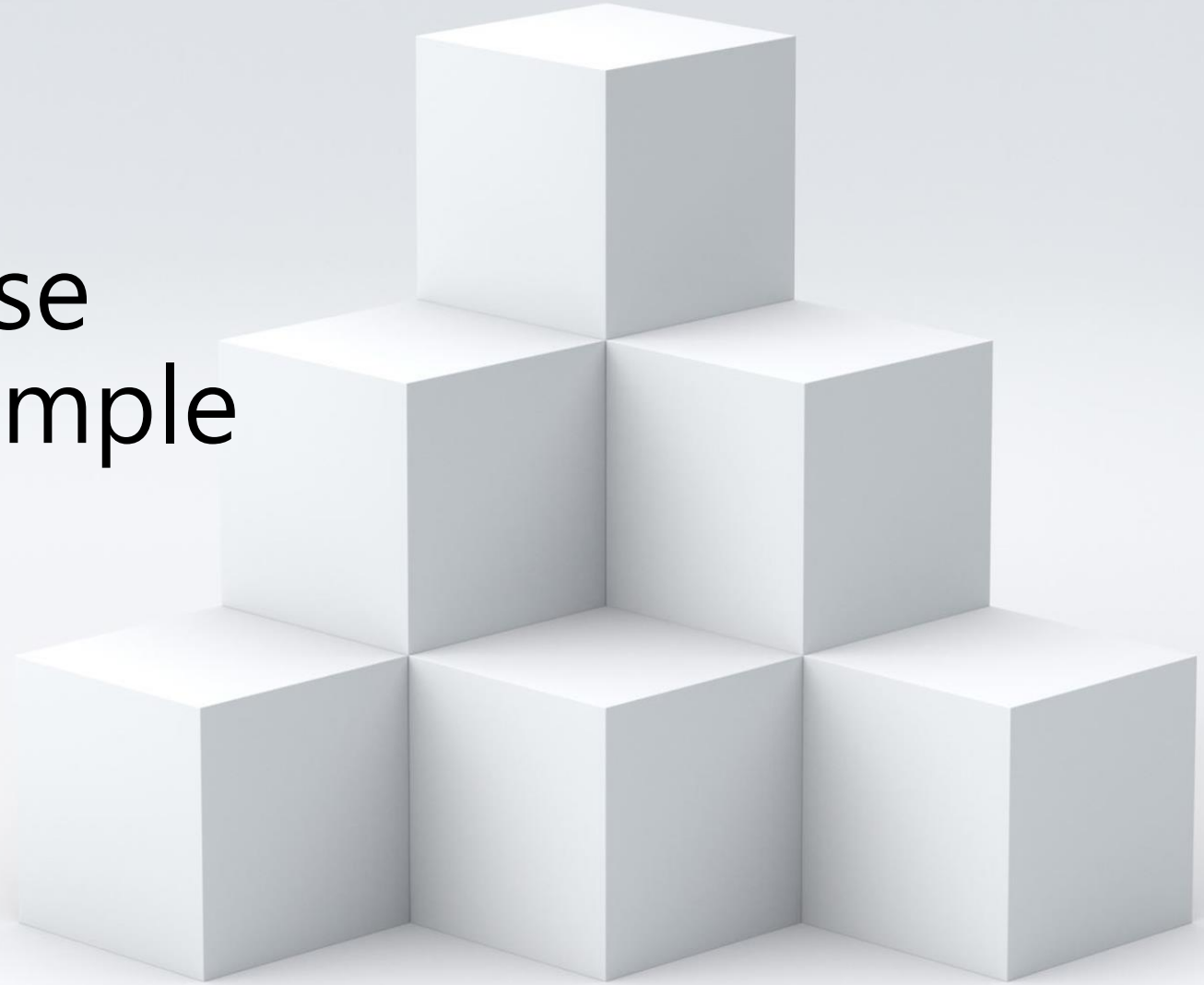
Software Engineering

- docker-compose multi-container example & networks -



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JSON (JavaScript Object Notation)

- Open standard file format and interchange format
- Human-readable text to store and transmit data objects consisting of key-value pairs and array data types
- Language-independent data format
- Derived from JavaScript, but many modern programming languages include code to generate and parse JSON format data

docker-compose.yml

```
version: '3.3'
services:
    class-offering:
        image: php:7.2-apache
        volumes:
            - ./classes:/var/www/html
        ports:
            - 5001:80

    website:
        image: php:7.2-apache
        volumes:
            - ./website:/var/www/html
        ports:
            - 5000:80
        depends_on:
            - class-offering
```

class-offering: index.php (in ./classes)

```
<?php
   $myclasses[] = “software engineering”;
   $myclasses[] = “project”;
   $myclasses[] = “web programming";

   $myJSON = json_encode($myclasses);

   echo $myJSON;
?>
```

Website: index.php (in ./website)

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Classes Offered</title>
</head>
<body>
    <h1>Classes Offered by Prof. Han Kim</h1>
    <ul>
        <?php
          $json = file_get_contents('http://class-offering');
          $obj = json_decode($json);

          foreach ($obj as $class) {
              echo "<li>$class</li>";
          }
        ?>
    </ul>

</body>
</html>
```

Docker networks

- docker-compose up -d
- docker network ls
- Docker networks = networks provided by docker for communication among containers
  = **network drivers implemented in Linux**
  1) bridge – default – virtual L2 switch - each container has its own private IP address
  2) host – host의 네트워크와 동일한 네트워크 사용
  3) overlay – docker swarm service 네트워크 – conventional overlay network (i.e., conventional virtual network)
  4) macvlan – MAC 주소에 대한 완전한 제어 제공 – each container has its own MAC address+IP address
  5) ipvlan – IP 주소 사용에 대한 완전한 제어를 제공 – each container has its own IP address sharing MAC with others
  6) none – no network interface provided for full customization
- User-defined bridge networks are best when you need multiple containers to communicate on the same Docker host.
- Host networks are best when the network stack should not be isolated from the Docker host, but you want other aspects of the container to be isolated.
- Overlay networks are best when you need containers running on different Docker hosts to communicate, or when multiple applications work together using swarm services.
- Macvlan / ipvlan networks are best when you want your containers to look like physical hosts on your network.
- Third-party network plugins allow you to integrate Docker with specialized network stacks.