אוניברסיטת
אריאל
בשומרון

Big Data & Cloud Ecosystems

ניהול וכריית נתוני עתק בסביבת ענן

Lesson 2-4

יוסי זגורי

Yossi.Zaguri@gmail.com

052-4668866

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Software Services

Services ?

- **שירות קלאסי**
  - סוג של תופעה "לא מוחשית" שתוצאתה צריכה שאינה כרוכה בבעלות.
- **שירותי תוכנה**
  - Cross Platform Software Component
  - שלב באבולציית יצירת רכיבי תוכנה לשימוש חוזר
  - אחד משניים : שירות אחסון או שירות עיבוד.
  - יכול להיות במסגרת ענן, או <u>לא</u>.
- **שירותי ענן**
  - רמות גרנולציה *שונות*
    - מאקרו : IaaS, PaaS, SaaS
    - מיקרו : Web Service

Software Services

- יחידת פונקציונאליות המספקת עיבוד או נתונים.
- "היורשת" של Software Component.
- מתאפיינת בצימוד נמוך וביכולת לשרת מגוון פלטפורמות וטכנולוגיות.
- מתקשרות ביניהן באמצעות מסרים הכוללים Meta Data.

Software Services

- פרדיגמת עיצוב & תכנות (בדומה ל- O.O)
- עקרונות עיצוב שירות תוכנה (מאת Don Box)
  - גבולות מוגדרים מפורשות

"Service-orientation is based on a model of explicit message passing rather than implicit method invocation"

  - אוטונומיות

"Service-oriented development departs from object-orientation by assuming that atomic deployment of an application is the exception, not the rule."

Software Services

- אינטראקציה מבוססת סכימות וחוזים, לא מחלקות

"Classes are convenient abstractions as they share both structure and behavior in a single named unit. Service-oriented development has no such construct. Rather, services interact based solely on schemas (for structures) and contracts (for behaviors)"

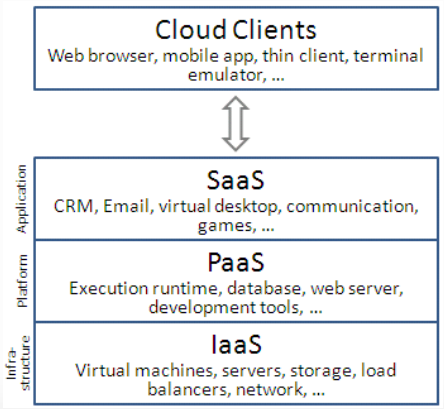
- תאימות נגזרת מהגדרות Policy

Object-oriented designs often confuse structural compatibility with semantic compatibility. Structural compatibility is based on contract and schema. Semantic compatibility based on explicit statements of capabilities & requirements in the form of policy Expression.

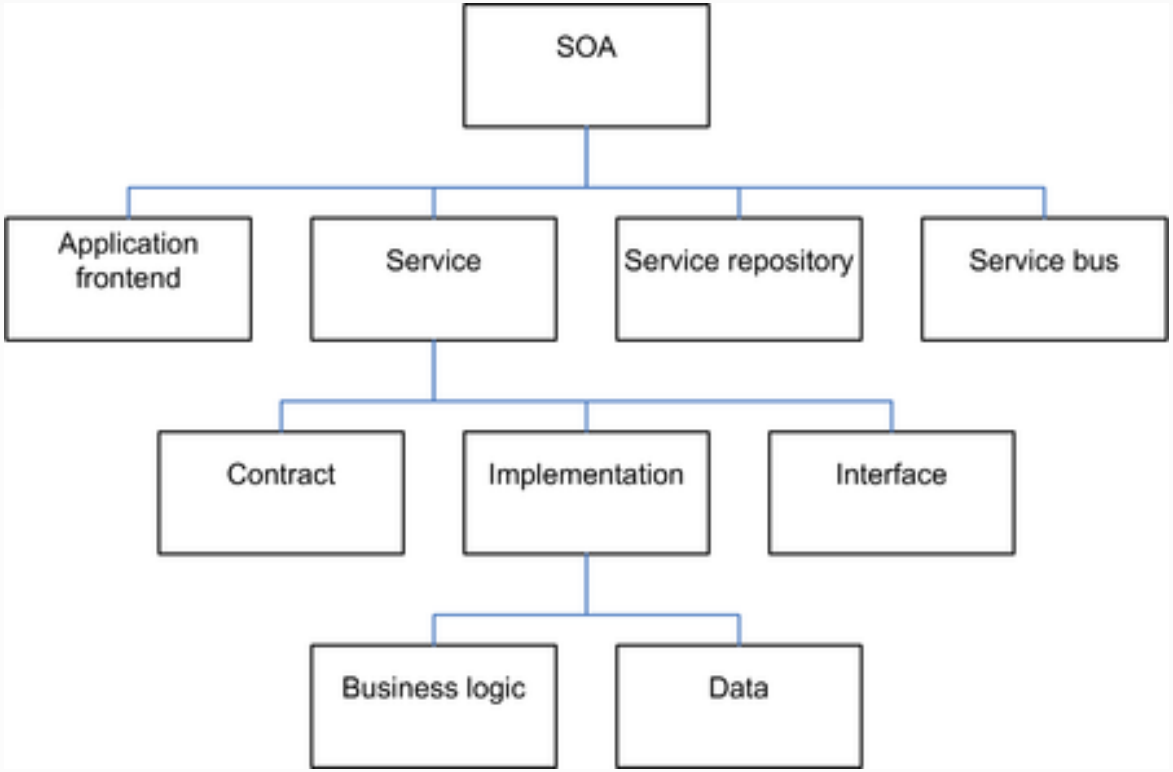
Policy expressions indicate which conditions and guarantees (called assertions) must hold true to enable the normal operation of the service

Cloud Services

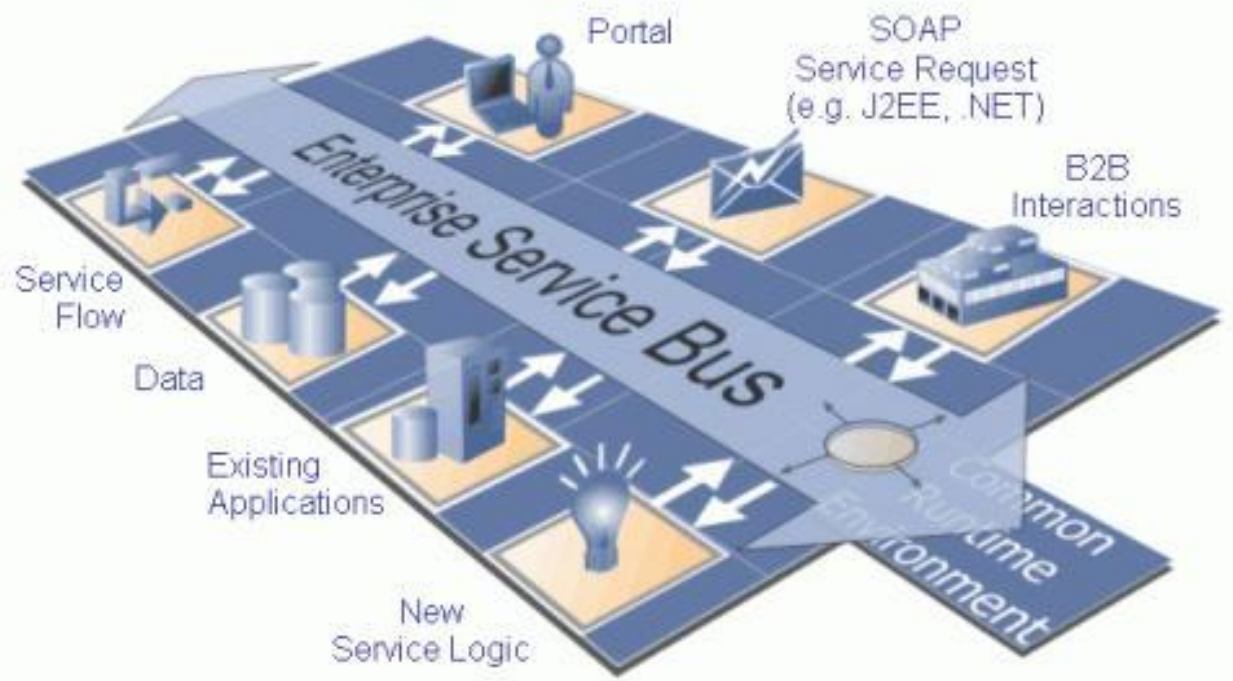
- **IaaS**
  - מכונות וירטואליות, אחסון, נתבים וירטואלים...
- **PaaS**
  - תשתיות לפיתוח אתרים
  - אירוח שירותי ענן
  - אחסון וניהול נתונים (טבלאות נתונים , Blobs , DB רלציוני)
  - שירותי ניהול משתמשים וזהויות
  - שירותי מסרים (תורים , Service Bus)
- **SaaS**
  - ... SalesForce, Goolge Docs, Office 365



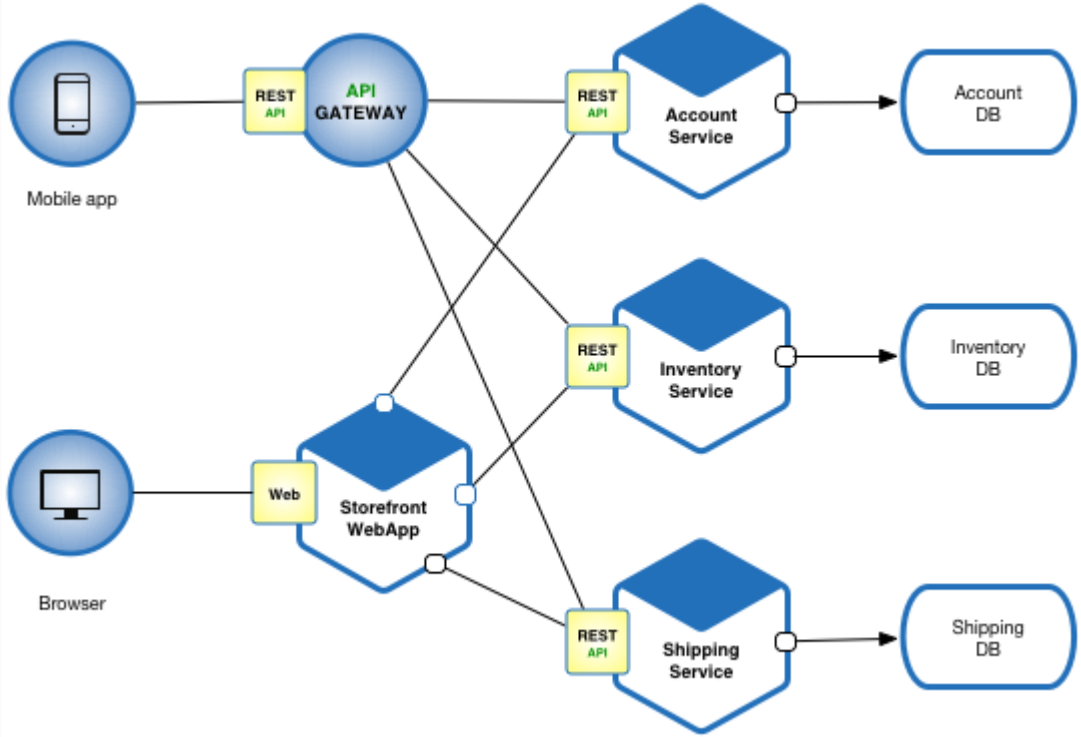
Service Oriented Architecture



Service Oriented Architecture



Microservices Architecture



http://microservices.io/patterns/microservices.html

Micro Services Pros

- Microservice architecture gives developers the freedom to independently develop and deploy services
- A microservice can be developed by a fairly small team
- Code for different services can be written in different languages (though many practitioners discourage it).
- Easy integration and automatic deployment (using open-source continuous integration tools such as Jenkins, Hudson, etc.)
- Easy to understand & modify for developers, can help a new team member become productive quickly.
- The code is organized around business capabilities.
- When change is required in a certain part of the application, only the related service can be modified and redeployed—no need to modify and redeploy the entire application.
- Better fault isolation: if one microservice fails, the other will continue to work (although one problematic area of a monolith application can jeopardize the entire system).
- Easy to scale and integrate with third-party services.
- No long-term commitment to technology stack, Can adopt new one's easily.

Micro Services Cons

- Due to distributed deployment, testing can become complicated and tedious.
- Increasing number of services can result in information barriers.
- The architecture brings additional complexity as the developers have to mitigate fault tolerance, network latency, and deal with a variety of message formats as well as load balancing.
- Being a distributed system, it can result in duplication of effort.
- When number of services increases, integration and managing whole products can become complicated
- In addition to several complexities of monolithic architecture, the developers have to deal with the additional complexity of a distributed system.
- Developers have to put additional effort implementing mechanism of communication between the services
- Handling use cases that span more than one service without using distributed transactions is not only tough but also requires communication and cooperation between different teams.
- Partitioning the application into microservices is very much an art.

What are Microservices ?

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Communication & Protocols

REST & HTTP

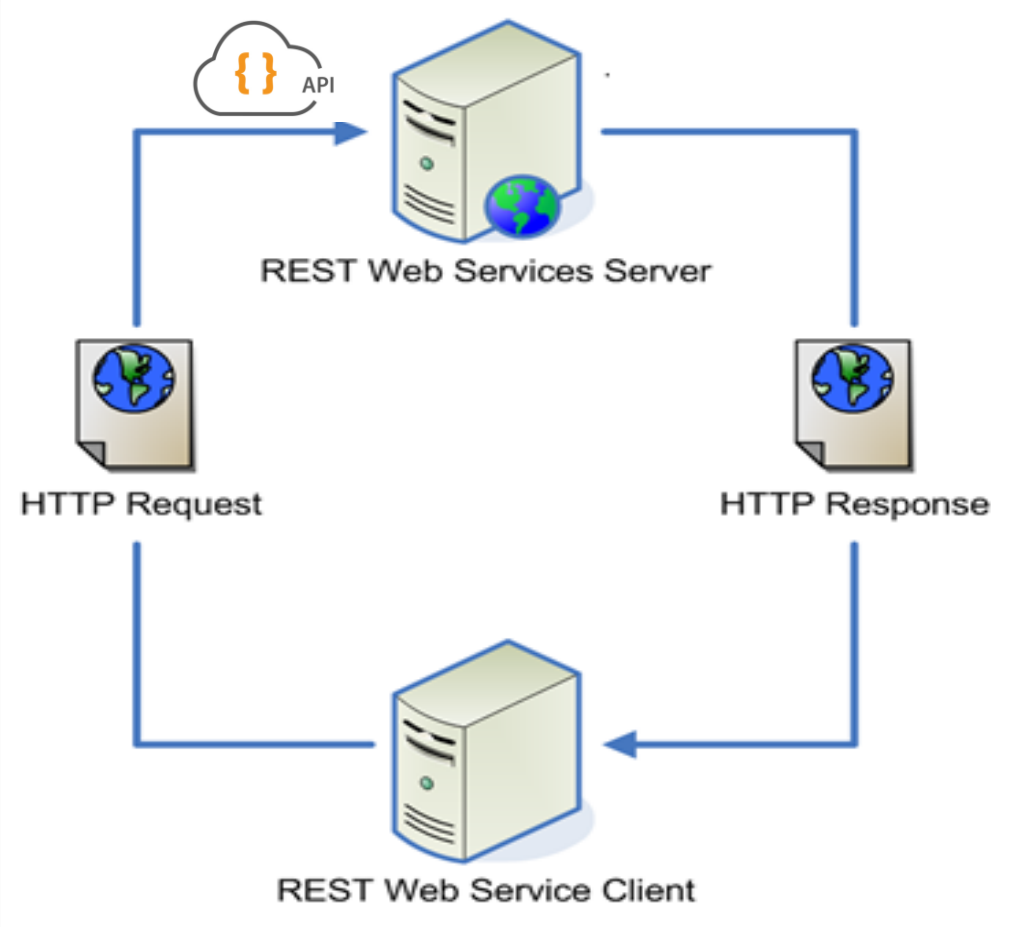
What is REST

REST

What is Http

HTTP

REST API



Data Exchange Formats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    </Book>
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        <author>Stephen E. Ambrose</author>
    </Book>
</Books>
```

Data Exchange Formats


```
one,two,three
1,2,3
4,3,2
```

CSV to JSON

```
[{"one":"1","two":"2","three":"3"},
{"one":"4","two":"3","three":"2"}]
```

XML to JSON

XML

```
... >
  <name>Barry & Associates, Inc.</name>
  <phone>612-321-8156</phone>
  <street1>14597 Summit Shores Dr</street1>
  <street2></street2>
  <city>Burnsville</city>
  <state>MN</state>
  <postalcode>55306</postalcode>
  <country>United States</country>
< ...
```

JSON

```
{
  "name"       : "Barry & Associates, Inc.",
  "phone"      : "612-321-8156",
  "street1"    : "14597 Summit Shores Dr",
  "street2"    : "",
  "city"       : "Burnsville",
  "state"      : "MN",
  "postalcode" : "55306",
  "country"    : "United States"
}
```

DEMO

https://www.codementor.io/nodejs/tutorial/how-to-use-json-files-in-node-js