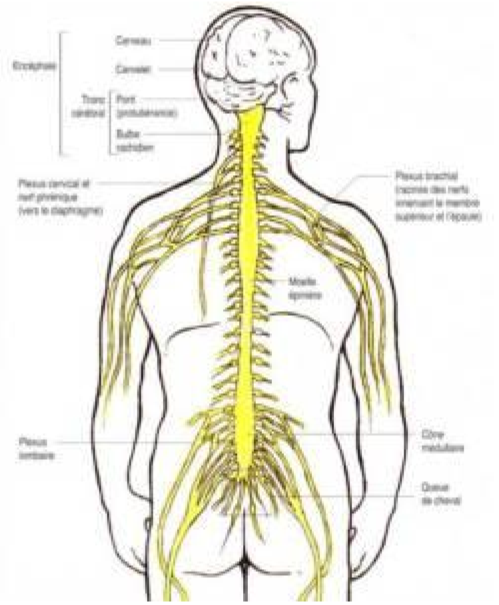
LP DAM - GL

Introduction to Services
Focus on REST* services

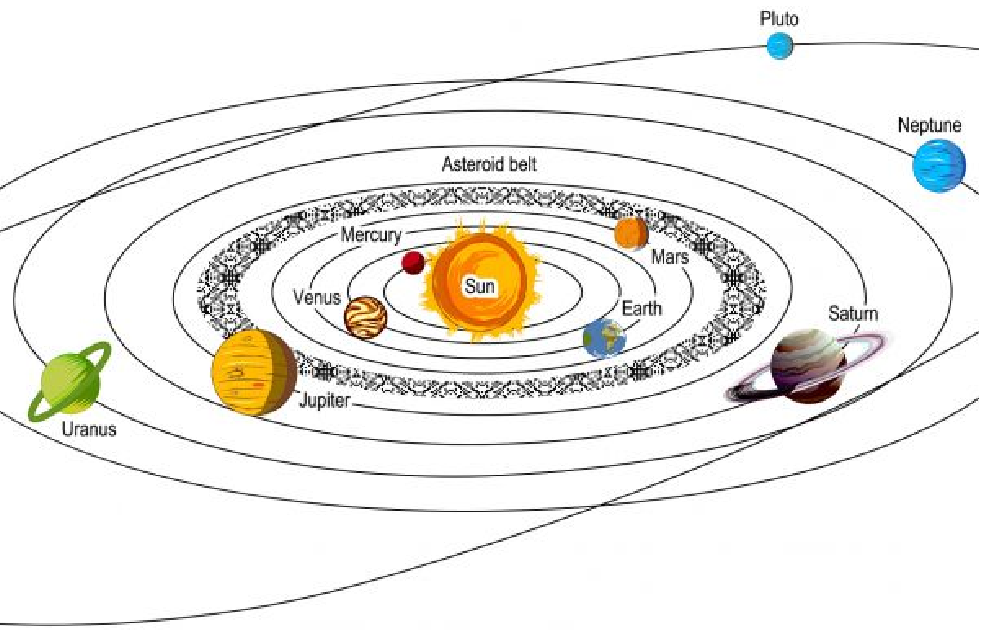
Based on Simon Urli's course

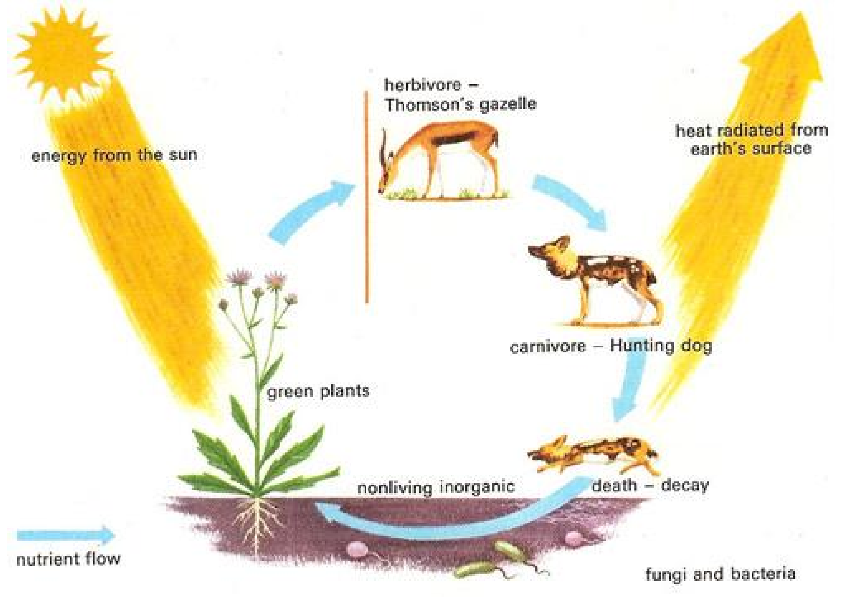
05/12/2016

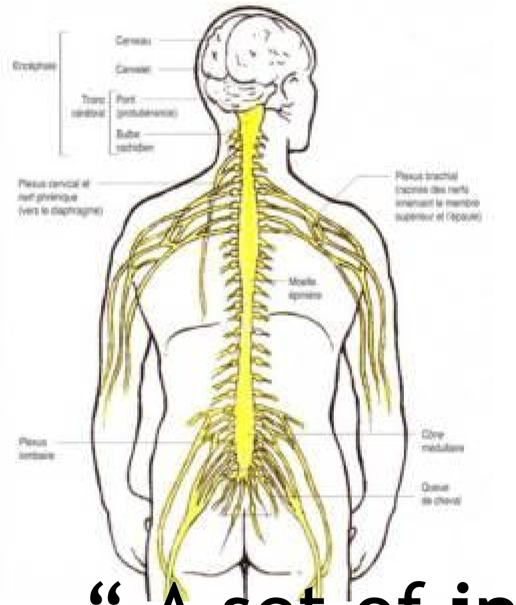
Cécile Camillieri


Encéphale
Cerveau
Cervelet
Tronc cérébral
Pont (protubérance)
Bulbe rachidien
Plexus cervical et nerf phrénique (vers le diaphragme)
Plexus brachial (racines des nerfs innervant le membre supérieur et l'épaule)
Moelle épinière
Plexus lombaire
Cône médullaire
Queue de cheval

System?


Pluto
Neptune
Asteroid belt
Mercury
Mars
Sun
Venus
Earth
Saturn
Jupiter
Uranus

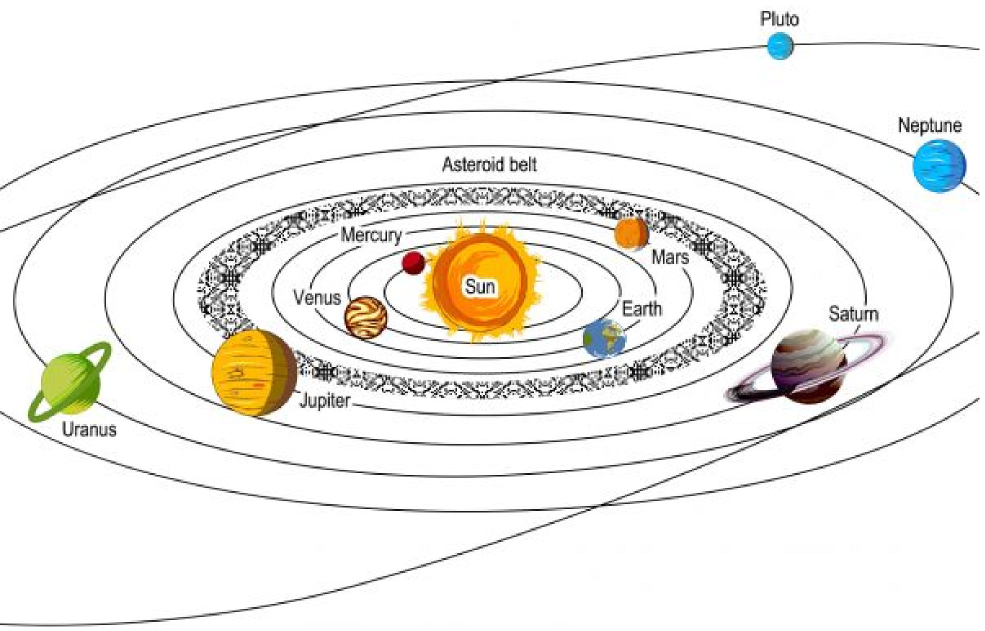

energy from the sun
herbivore – Thomson's gazelle
heat radiated from earth's surface
carnivore – Hunting dog
green plants
nonliving inorganic
death – decay
nutrient flow
fungi and bacteria

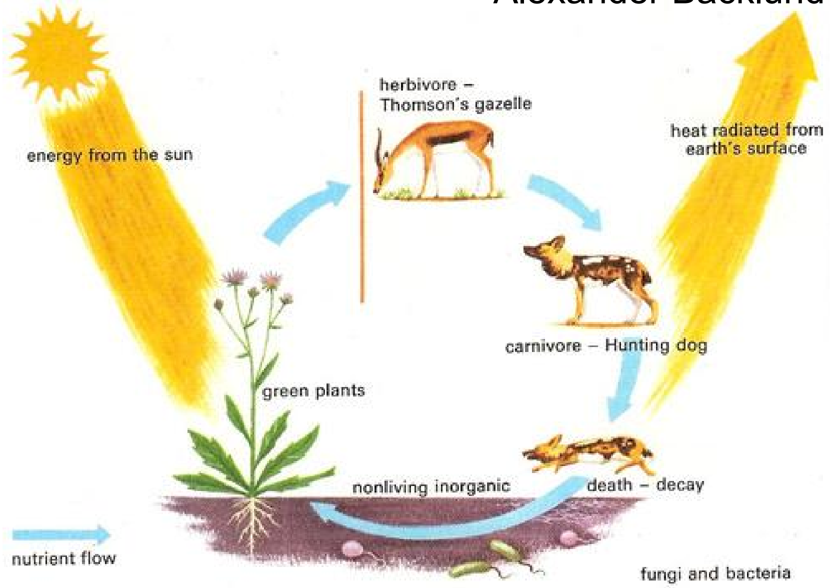


System?

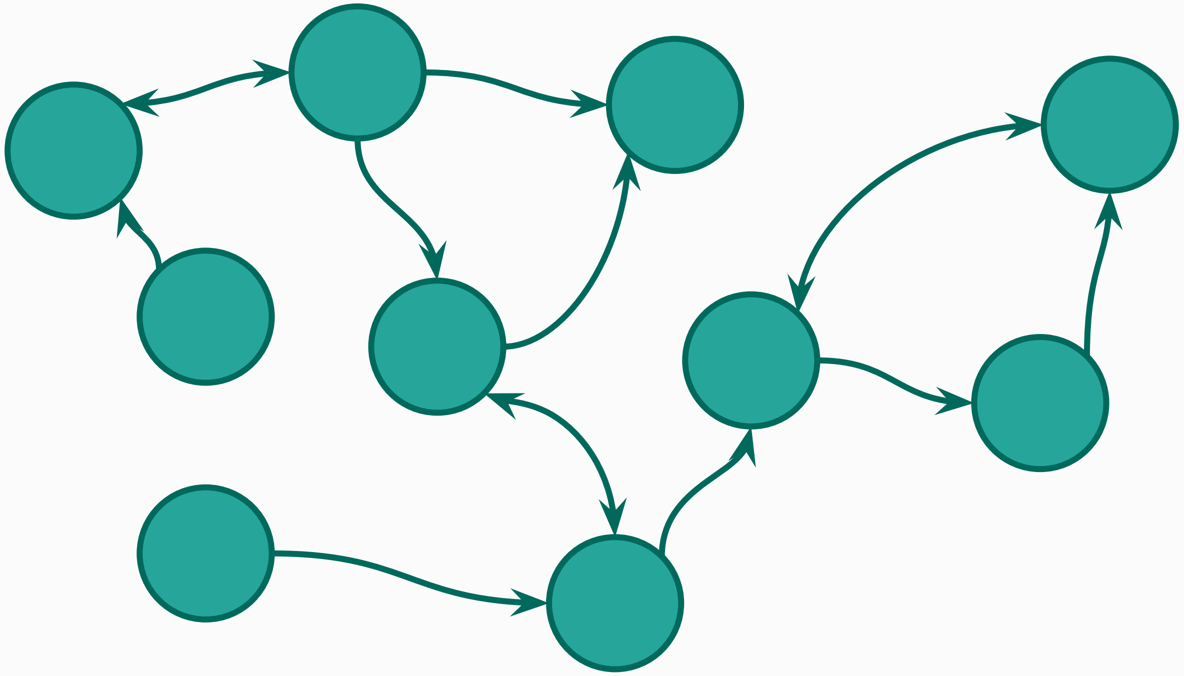
“ A set of **interacting** or **interdependent components** forming a complex whole ”

Alexander Backlund



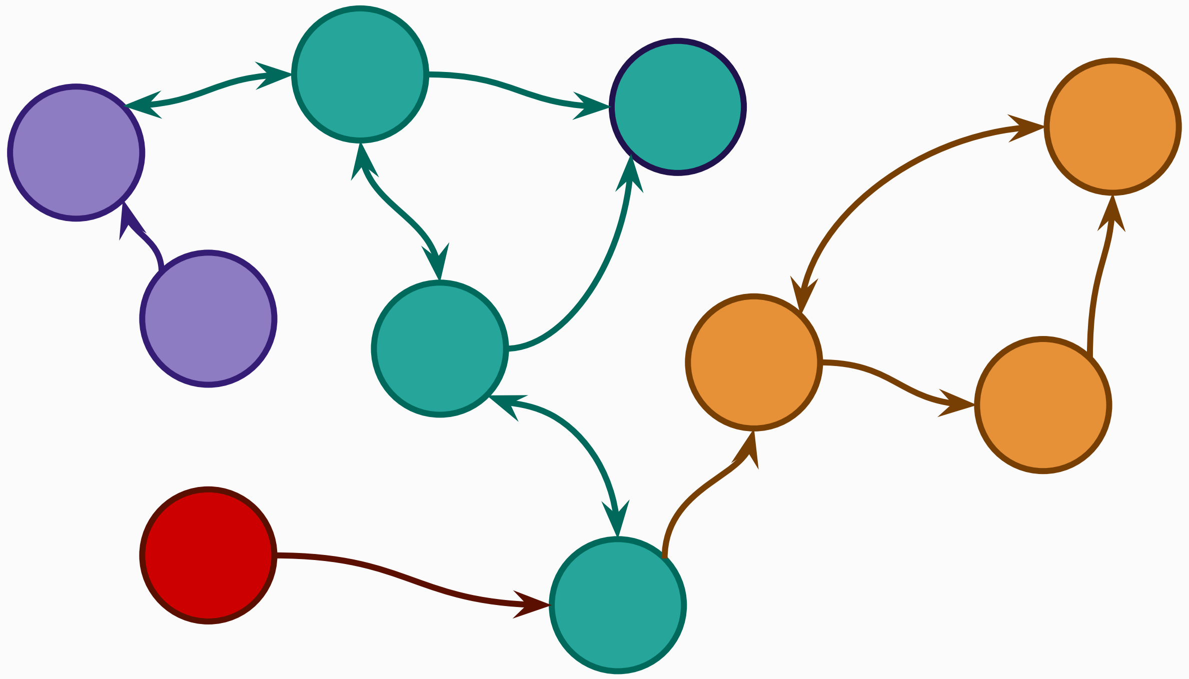


System



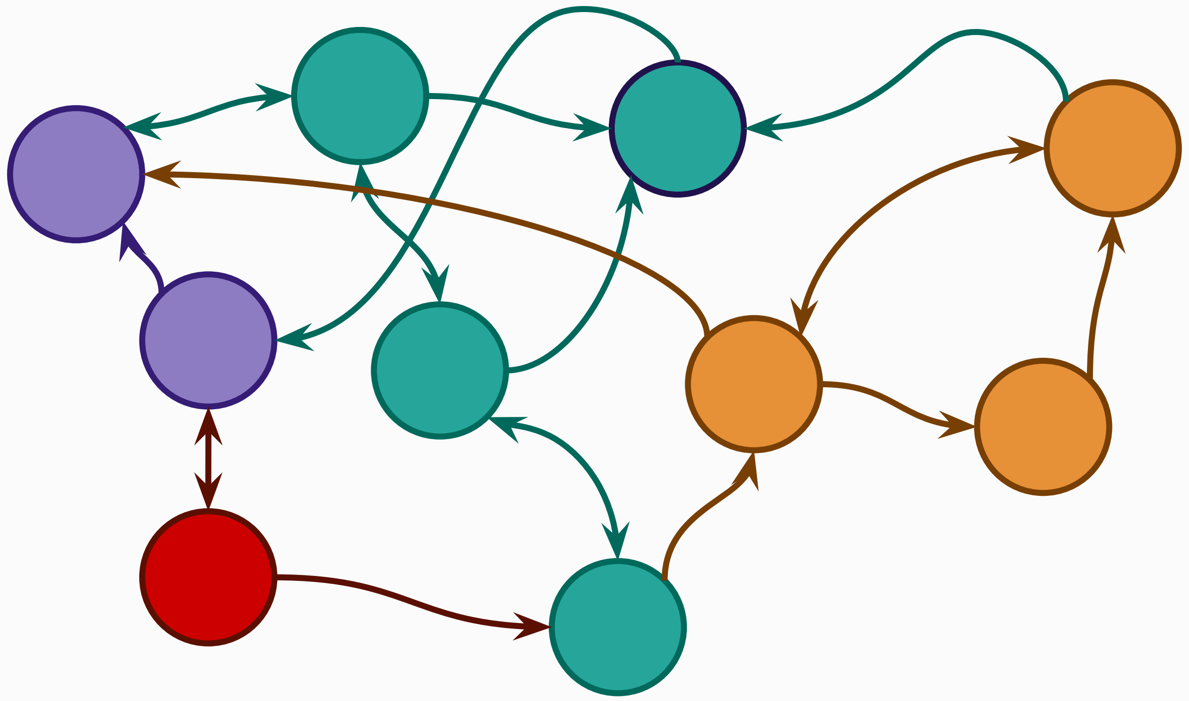
“ A set of **interacting** or **interdependent components** forming a complex whole ”

Software System



“ A set of **interacting** or **interdependent** **components** forming a complex whole ”

Software System



“ A set of **interacting** or **interdependent components** forming a complex whole ”

What we want to avoid...

What we’d rather have

But how?

Towards services

→ Objects

→ Components

→ Services

Objects

- Encapsulate methods and attributes in a **single software unit.**
- Needs to be compiled or interpreted
- Made to interact with other Objects

⇒ Assembly at a very low level

Components

- There is not one component definition
  → library, packet, plugin, etc.
- A component is a **black box**
  that is used directly from its **interfaces**
- It is **a part** of the software.

⇒ Assembly at a high level

Services

- A service is a component that is **external** to the system.
- Focuses on a specific functionality.
- A **black box** that is used directly from **interfaces.**
- Need to specify how data is **serialized**.

⇒ Assembly at a high and distributed level

Service Oriented Architecture

Service oriented architecture

→ How to transfer messages?

→ How to find a service and its interfaces?

→ How to handle the obtained data?

Transfer messages

- Services = **distributed** systems
- Communication through **network**

Over TCP/IP

- Several protocols

→ RPC, JRMP (for RMI), IIOP (pour CORBA), etc.

Over HTTP

- **Web**Services (!)

→ SOAP or REST

Find services and their interfaces

- UDDI: web services discovery

  Centralized directory that can be queried to get information on a service.

- Interface:
  - WDSL for SOAP: XML contract file describing all informations associated to a service.
  - WADL for REST: equivalent to WSDL, not highly used.

Manipulate Data

- WDSL contains all information on the data types
- Serialization in XML or JSON

Web Services

SOAP (Simple Object Access Protocol)

- Standardized by the OMG
- Based on XML
- Can be used with different transfer protocols
- Used in big systems
- Deployment is costly

REST (Representational State Transfer)

- No standard: mostly (good) practices
- Based on the concept of resources
- Uses HTTP for communication
- Used (more or less good) in many open APIs on the web (Twitter, FlickR, Facebook, Instagram, etc…)
- Deployment is easy

WAIT A MINUTE!

One cannot solve everything

Focus on REST

REST and Resources

- Focus on the **data** that is manipulated

- URL is composed from the resources → no verb

  http://myapi.com/**library**
  http://myapi.com/**library**/12/**book**
  http://myapi.com/**library**/12/**book**/42

- Use of HTTP's **CRUD** operations

POST	**C**reate (Update)
GET	**R**ead
PUT	**U**pdate
DELETE	**D**elete

REST and Resources

- Use of HTTP's **CRUD** operations:

POST	**C**reate (Update)
GET	**R**ead
PUT	**U**pdate
DELETE	**D**elete

- Example:

GET	http://myapi.com/**book**	**Retrieve list of books**
POST	http://myapi.com/**book**	**Add a book**
GET	http://myapi.com/**book**/42	**Retrieve book 42**
PUT	http://myapi.com/**book**/42	**Update book 42**
DELETE	http://myapi.com/**book**/42	**Delete book 42**

REST**ful** APIs

- Client-Server exchange
- Stateless
- Cache the most requested resources
- Resources oriented
- Layers/hierarchy of resources

REST**like** APIs

- Client-Server exchange
- Stateless
- ~~Cache the most requested resources~~
- Resources oriented
- ~~Layers/hierarchy of resources~~

Web APIs

- Client-Server exchange
- ~~Stateless~~
- ~~Cache the most requested resources~~
- Resources oriented
- ~~Layers/hierarchy of resources~~

And for us

Creating a REST* API in Java

- Use the Jersey implementation (https://jersey.com.java)
- Use annotations: @GET, @POST, @Path, @Consumes, etc.
- Generate a **war** thanks to maven
- Deploy on an application server (Tomcat, Jetty, etc.)

Demo

?