

Software Engineering

João Caldeira

Invited Professor

Email. joaocarlos.caldeira@my.istec.pt

Mob. +351 917769544

January 11, 2023



Software Construction

January 11, 2023



Software Construction

Service-Oriented Software Engineering

- **Definition**

- Services are a natural development of software components where the component model is, in essence, a set of standards associated with web services.
- A web service can therefore be defined as:
 - **A loosely coupled, reusable software** component that encapsulates discrete functionality, which may be distributed and programmatically accessed.
 - A web service is a service that is accessed using standard Internet and XML-based protocols.
- A critical distinction between a service and a software component, as defined in component-based software engineering, **is that services should be independent and loosely coupled.**

Software Construction

Service-Oriented Software Engineering

- **Service-Oriented Architecture**

1. **SOAP.**

- **Relies exclusively on XML to provide messaging services.**
- Microsoft originally developed SOAP to take the place of older technologies that don't work well on the internet such as the Distributed Component Object Model (DCOM) and Common Object Request Broker Architecture (CORBA).

2. **RESTful .**

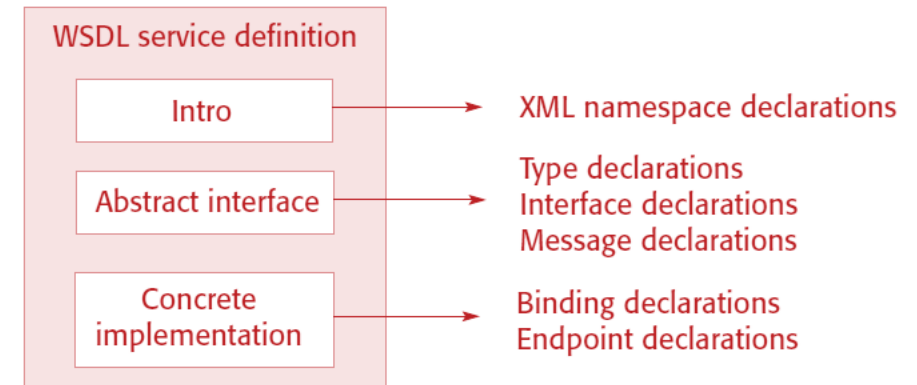
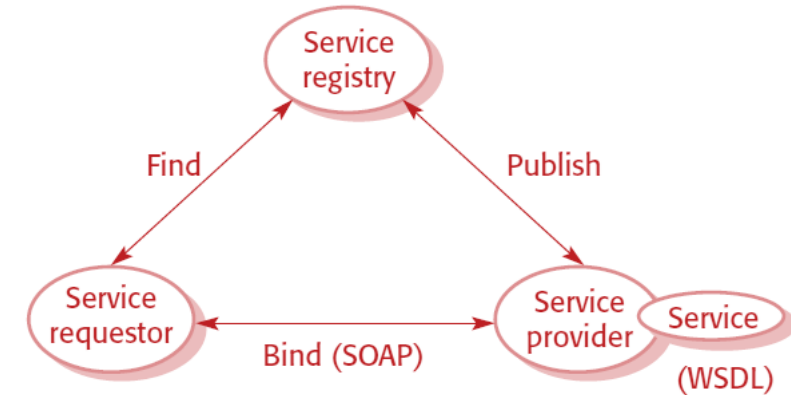
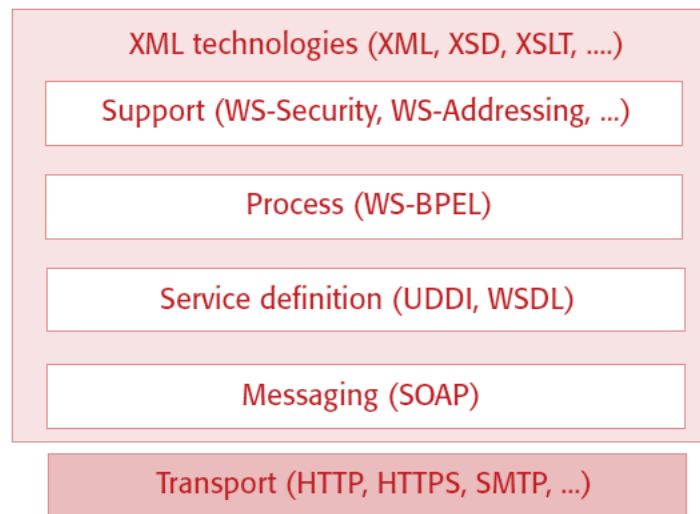
- **Provides a lighter-weight alternative.** For example, working with SOAP in JavaScript means writing a ton of code to perform simple tasks because you must create the required XML structure every time.
- Instead of using XML to make a request, REST (usually) relies on a simple URL.
- In some situations, you must provide additional information, but most web services using REST rely exclusively on using the URL approach.
- **REST can use four different HTTP verbs (GET, POST, PUT, and DELETE) to perform tasks.**

Software Construction

Service-Oriented Software Engineering

- **Service-Oriented Architecture**

1. **SOAP.**

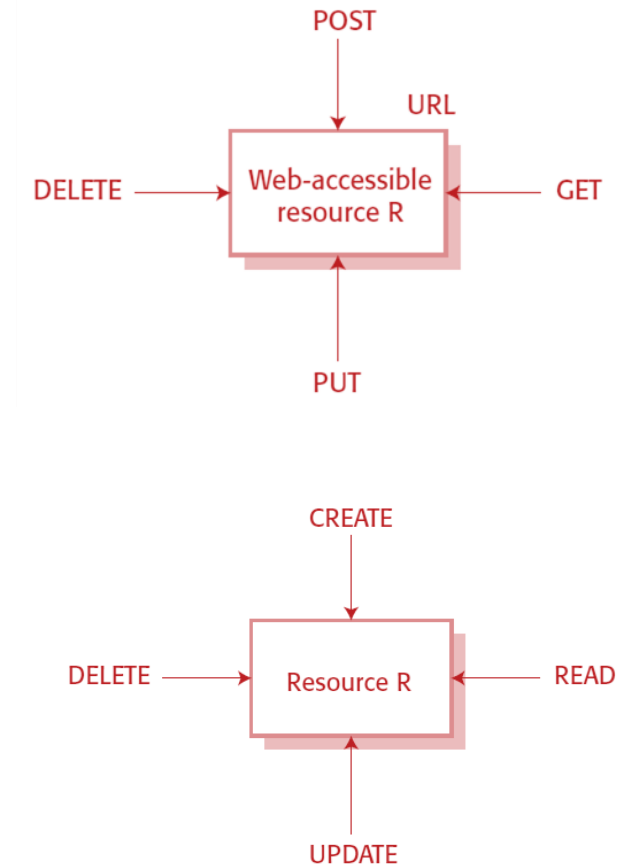


Software Construction

Service-Oriented Software Engineering

- **RESTful Services**

- The Web is an example of a system that has a **RESTful architecture**. Web pages are resources, and the unique identifier of a web page is its URL.
- The web protocols http and https are based on four actions, namely, **POST, GET, PUT, & DELETE**
 1. **POST**. Is used to create a resource. It has associated data that defines the resource.
 2. **GET**. Is used to read the value of a resource and return that to the requestor in the specified representation, such as XHTML, that can be rendered in a web browser
 3. **PUT**. Is used to update the value of a resource.
 4. **DELETE**. Is used to delete the resource.



Software Construction

Service-Oriented Software Engineering

- **Service Engineering**

1. **Service candidate identification.**

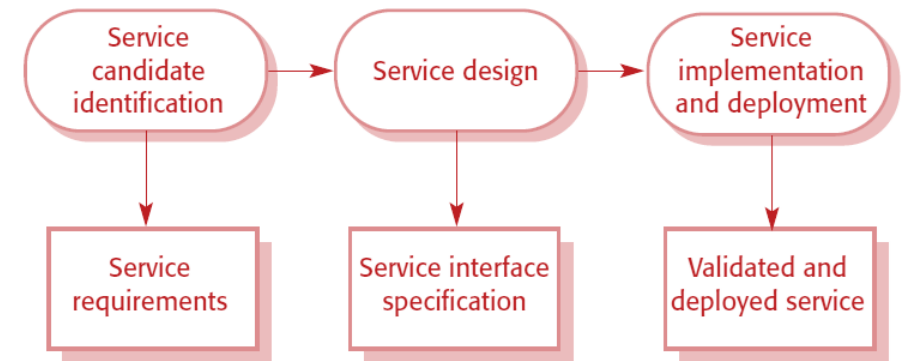
Where you identify possible services that might be implemented and define the service requirements.

2. **Service design.**

Where you design the logical service interface and its implementation interfaces (SOAP-based and/or RESTful).

3. **Service implementation and deployment.**

Where you implement and test the service and make it available for use.



Software Construction

Service-Oriented Software Engineering

- **Summary**

1. Service-oriented architecture is an approach to software engineering where reusable, standardized services are the basic building blocks for application systems.
2. Services may be implemented within a service-oriented architecture using a set of XML-based web service standards. These include standards for service communication, interface definition, and service enactment in workflows.
3. Alternatively, a RESTful architecture may be used, which is based on resources and standard operations on these resources. A RESTful approach uses the http and https protocols for service communication and maps operations on the standard http verbs POST, GET, PUT, and DELETE.
4. Services may be classified as utility services that provide a general-purpose functionality, business services that implement part of a business process, or coordination services that coordinate the execution of other services.
5. The service engineering process involves identifying candidate services for implementation, defining the service interface, and implementing, testing, and deploying the service.
6. The development of software using services is based on the idea that programs are created by composing and configuring services to create new composite services and systems.
7. Graphical workflow languages, such as BPMN, may be used to describe a business process and the services used in that process. These languages can describe interactions between the organizations that are involved.