Distributed Systems 2012 – Assignment 2

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Web Services
Today’s Menu

- Quick walkthrough of Web application architectures
  - WS-* **Web Services**
  - **Representational State Transfer** (REST)

- Exercise 2
  - Overview
  - Tasks
  - Hints & Anchors
Web Services

- Definition:

  “A Web service is an application component accessible over open protocols”
Web Services in a Nutshell

Client

lookup

WSDL

lookup

UDDI

publish

WSDL

request/reply

SOAP

Server
Web Services in a Nutshell

- For the exercise, we let the service publish its WSDL without going through a UDDI...
Web Services - WSDL Overview

- **WSDL**: **W**eb **S**ervices **D**escription **L**anguage describes:
  - What a Web service can do
  - Where it resides
  - How to invoke it

- Explore WSDL
  
  Ex. [http://vslab.inf.ethz.ch/SunSPOTWebServices/SayHello?Tester]

Types, Messages, PortType, Binding, Service, Port, Definition
REST: Representational State Transfer

- REST is a lightweight architecture style for designing networked applications
  - HTTP 1.1 implements the REST architectural style
    - It uses HTTP for CURD (Create/Update/Read/Delete) operations
- Platform independent
- Language independent
- Standard-based

[http://geekandpoke.typepad.com/]

GEDD FOR DUMMIES

AND WHEN YOU WANNA SEE THE INVOICE WITH THE ID 42 JUST TYPE
http://hitchhiker.lifeexotian.com/services/invoice?id=42
INTO THE ADDRESS BAR! ISN'T THAT UBERCOOL?

CHAPTER 1: BE AWARE THAT NOT EVERYBODY SHARES YOUR ENTHUSIASM ABOUT RESTFUL API!

[http://geekandpoke.typepad.com/]
REST Architecture

- **Resources**: Which are identified by logical URIs
  - State and functionality are represented using resources
  - e.g., a sensor node: [http://vslab.inf.ethz.ch:8081/sunspots/Spot1](http://vslab.inf.ethz.ch:8081/sunspots/Spot1)

- **A web of resources**: Resources are linked
  - Similar to the interconnection of web pages in the WWW
  - When relevant, resources should link to additional information
    - Resources should be kept simple

- **Stateless** communication protocol:
  - Each new request must carry all the information required to complete it
Assignment 2 – Overview

- **Objectives:**
  - Learn to develop distributed Web applications
  - Use the two different paradigms seen in the lecture:
    - Representational State Transfer (REST)
    - Web Services (WS-*)

- **Dates:**
  - Exercise begins: Now (October 12, 2012)
  - Exercise is due: 9:00 am, October 24, 2012
Assignment 2 – System Setup

- Access Sun SPOTs through WS-*/REST
- Sun SPOTs: Wireless sensor nodes (temp, acc, light, ...)

[http://code.google.com/p/hcsfsp/]
Assignment 2 – Tasks

1. Experimenting with RESTful Web Services (2P)
   - Create an HTTP request
     - a) “by hand” (i.e., without the use of any HTTP library)
     - b) using org.apache.http.*
   - Use HTTP content negotiation to get machine-readable data
   - Connect to a Sun SPOT and retrieve the temperature value

2. Experimenting with WS-* Web Services (2P)
   - Explore WSDL, create SOAP requests
   - Connect to a Sun SPOT and retrieve the temperature value.
   - **Hint:** You should not perform long running operation on the UI thread. Specifically for this task network access.
3. Assessing Web Service Technologies (1P)

- Evaluate the two technologies, REST and WS-*, by answering the questions in the form:
  [http://tinyurl.com/9mur7w6]
Assignment 2 – Tasks

4. Cloud Services (1P)
   - Visualization of retrieved measurements using the Google Chart API

5. Your Phone as a Server (2P)
   - Implement a Web Server on your phone that allows to access the phone’s sensors and actuators

6. Report (2P)
Submission

- Same as for Assignment 1
  - Programs/Code, Report

+ Assignment form:
  [http://tinyurl.com/9mur7w6]
Assignment 2 Hints - Relevant Terminology

- Media types: HTML, XML, JSON
- ROA – Resource-Oriented Architecture
- REST – Representational State Transfer
- SOA – Service-oriented Architecture
- SOAP – Simple Object Access Protocol
- WSDL – Web Services Description Language
REST Hints

- [http://www.infoq.com/articles/rest-introduction](http://www.infoq.com/articles/rest-introduction)

- **RESTful Web Services** (Leonard Richardson und Sam Ruby)
  - Available at D-INFK library

- **Apache HTTP library** (simplest sample code alive... 😊)
WS-* Hints

- Patched version of kSOAP2

- Short tutorial on kSOAP2 for Android
Visualization Hints

- Google charts API example:
  
  https://chart.googleapis.com/chart?chs=250x100&chd=t:60,40&cht=p3&chl=Hello|World

- Getting started:
  
  http://code.google.com/apis/chart/image/docs/making_charts.html#usingthewizard
Have Fun Programming!
Introduction to Assignment 2
Distributed Systems Lecture
HS 2012, ETH Zurich

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