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# cloud computing and web services

- Version 2013\_09\_25
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# Preamble



preamble



# Preamble

- Academic presentation of sbVB
- Brief History of Everything



# What is Cloud Computing ?

- Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet).
- Many services are delivered by the cloud.
  - Software as a service (SaaS)
  - Storage as a service (STaaS)
  - Desktop virtualization
  - others





# Purpose of this course

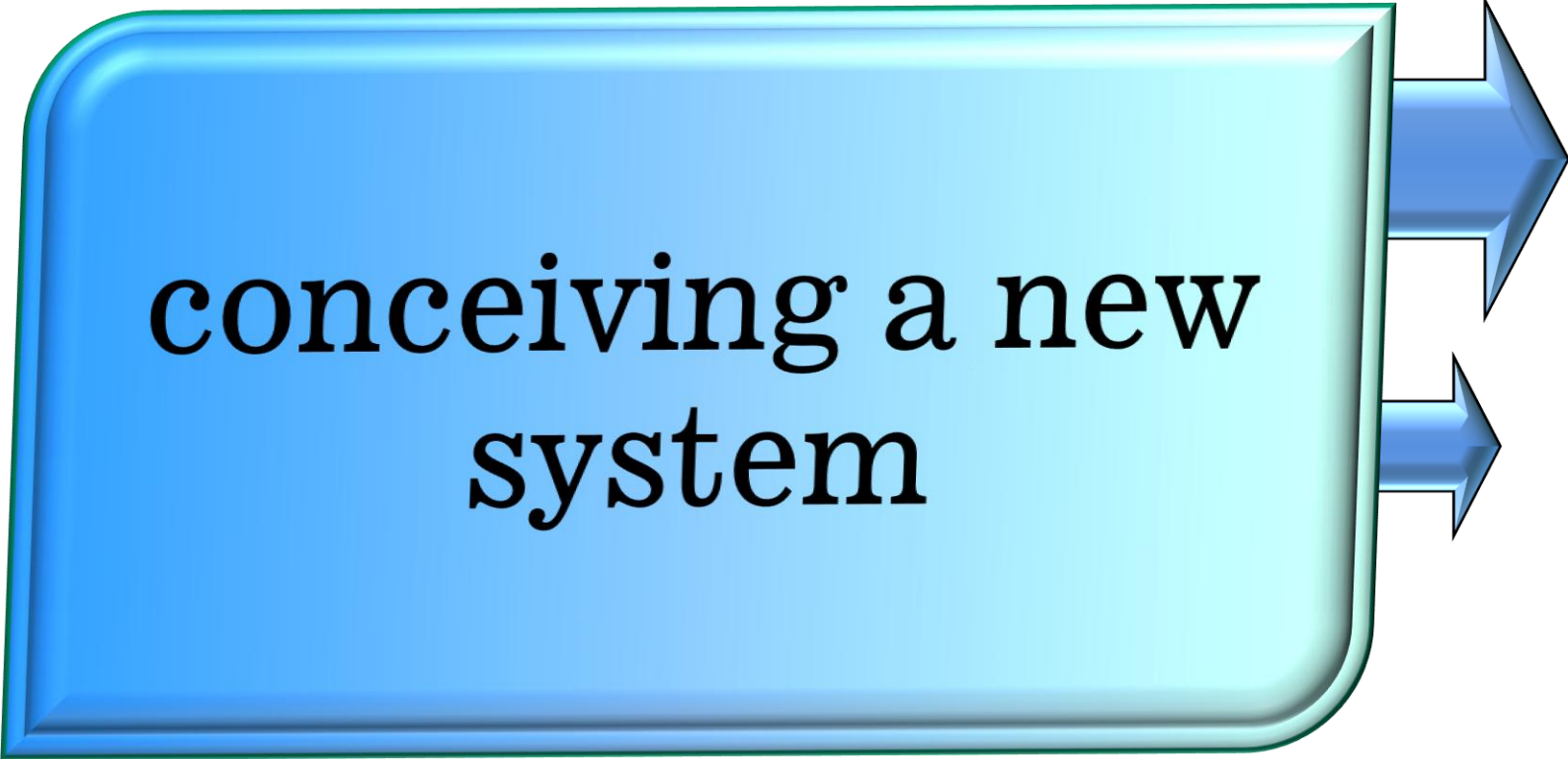
- Study, develop and investigate the skills of “software development for cloud computing”
  - emphasis on web services implemented with java programming
- Course contents
  1. history and analysis of the economic environment of cloud computing
  2. software architecture for cloud, its relations with mobile and business models related to it.
  3. brief review of java
  4. Software development for cloud



web services  
& soa



# Conceiving a new system

A large, light blue rounded rectangle with a 3D effect and a dark blue border. Two blue arrows point to the right from the right side of the rectangle, one above the other.

conceiving a new  
system



# Basic recipe

- Determine the main entities (in the database)
- Determine the main use-cases
- Determine the system's actors (User-Groups)
- Determine the use-case – actor authorization table (as data for DOUA).





# Some definitions

- “Manage” means CRUD (Create Retrieve, Update, Deleta)



inovação  
e sucesso nos  
negócios





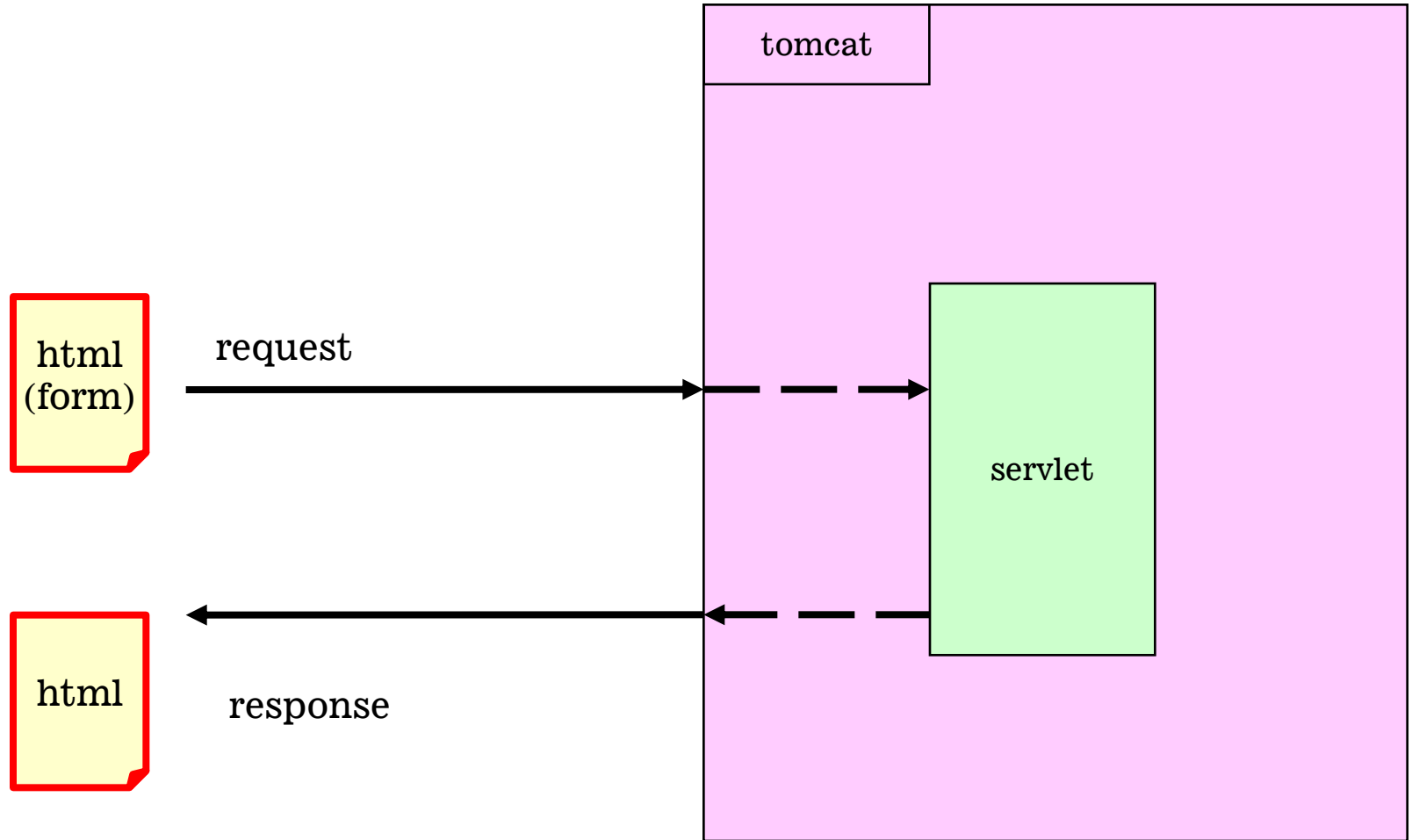
# Escolha estratégica de arquitetura

- Da mesma forma que a tecnologia, é muito custoso mudar a arquitetura de um sistema web.
  - Portanto é conveniente que se pense nos objetivos de longo prazo do sistema na hora de definir a arquitetura.



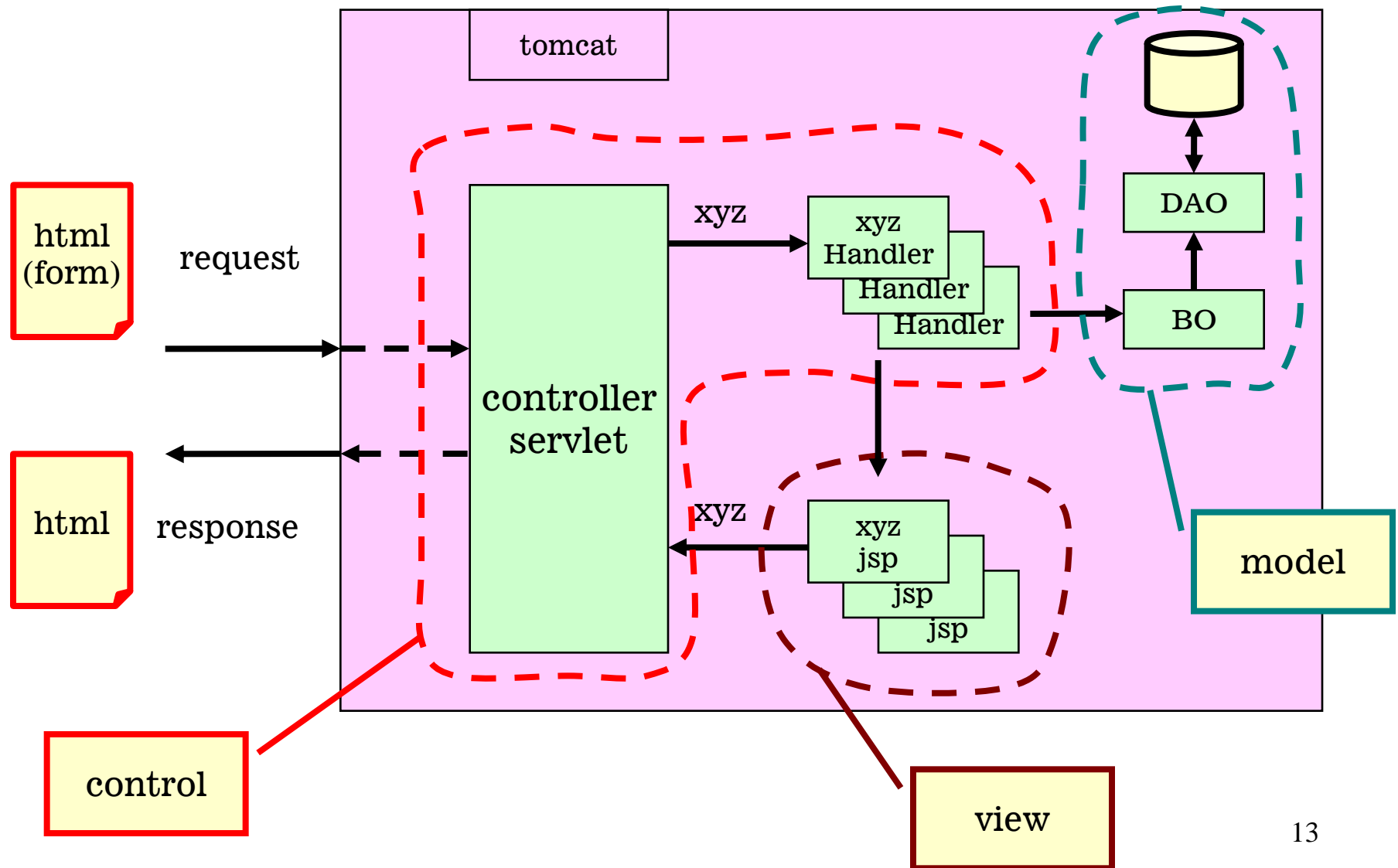
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# MVC architecture with Tomcat



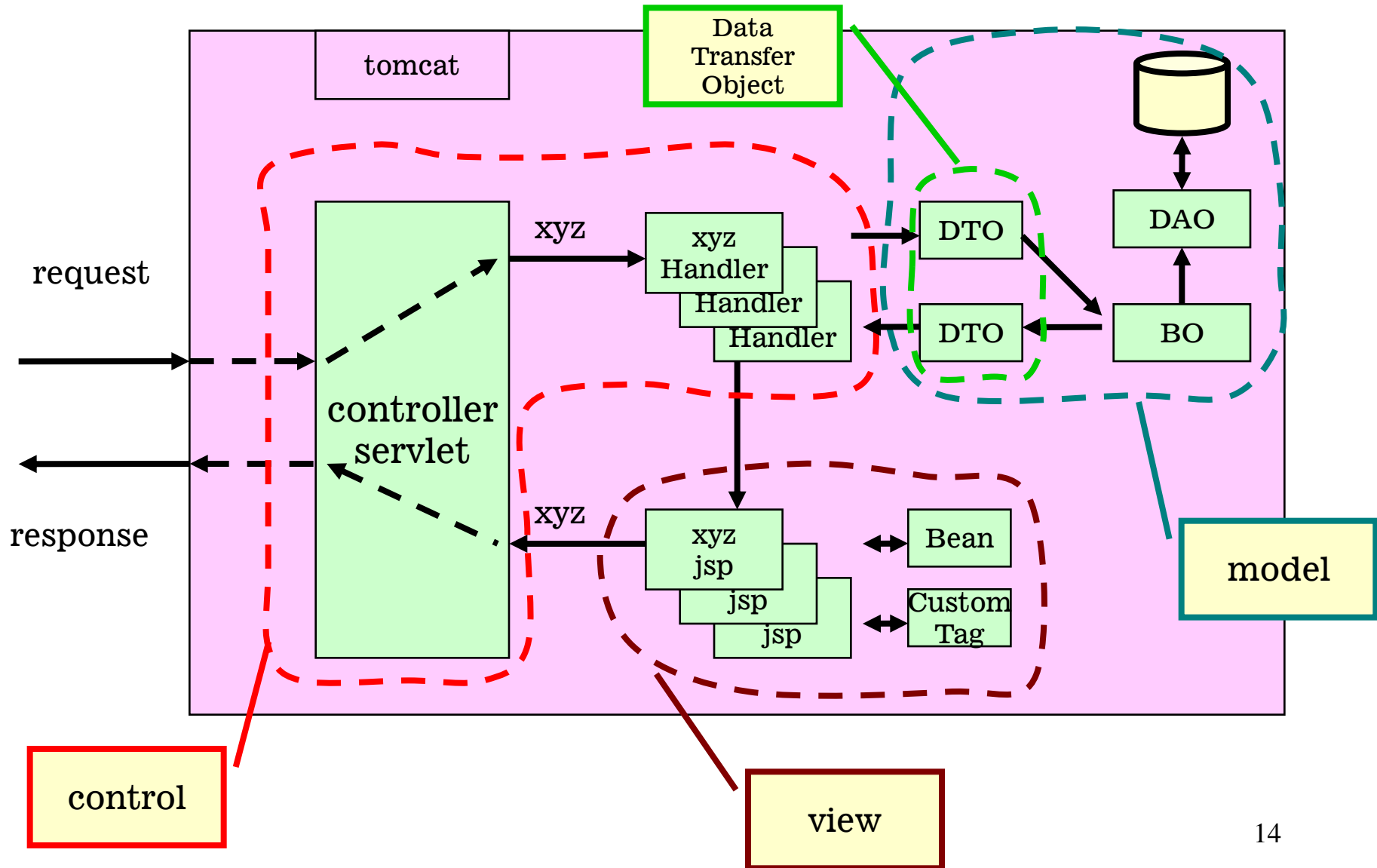


# MVC (Model View Controller) architecture with Tomcat



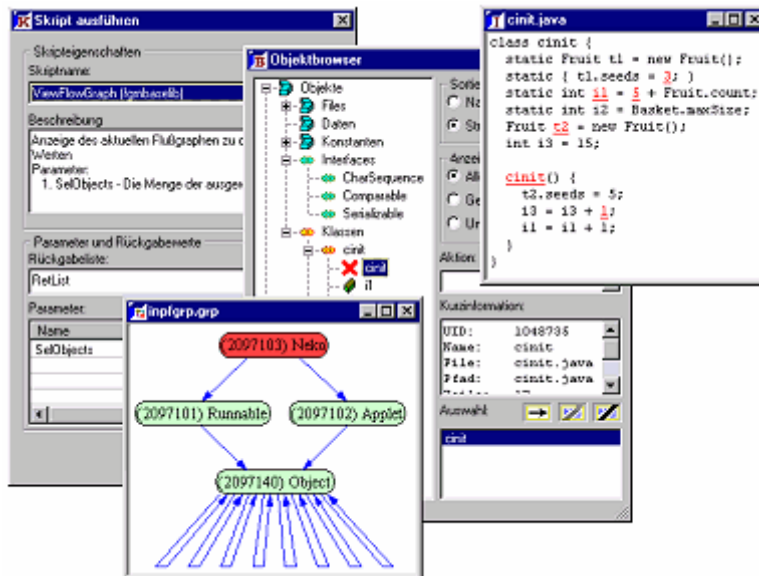
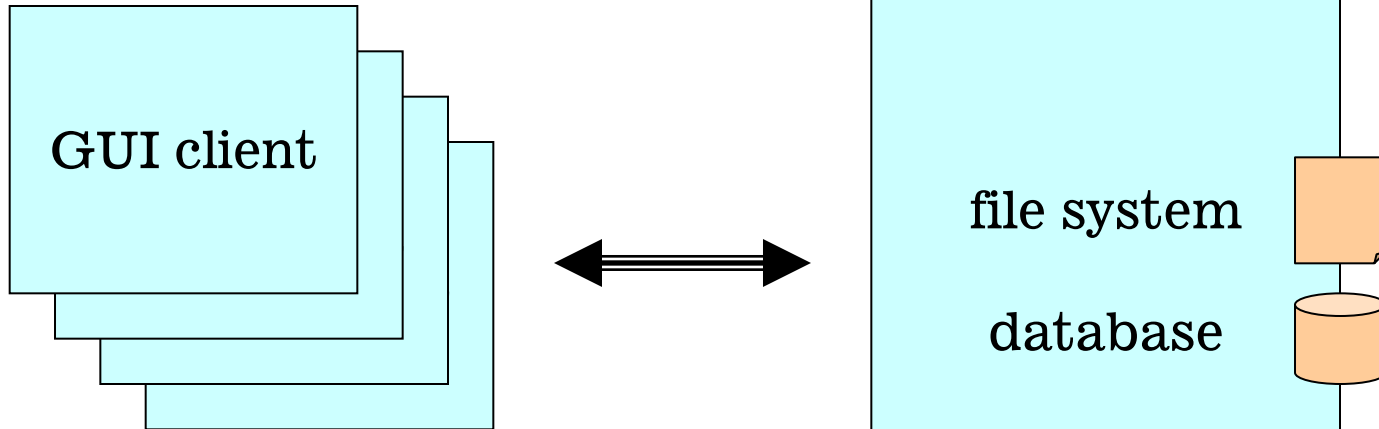


# MVC (Model View Controller) architecture with Tomcat (2)



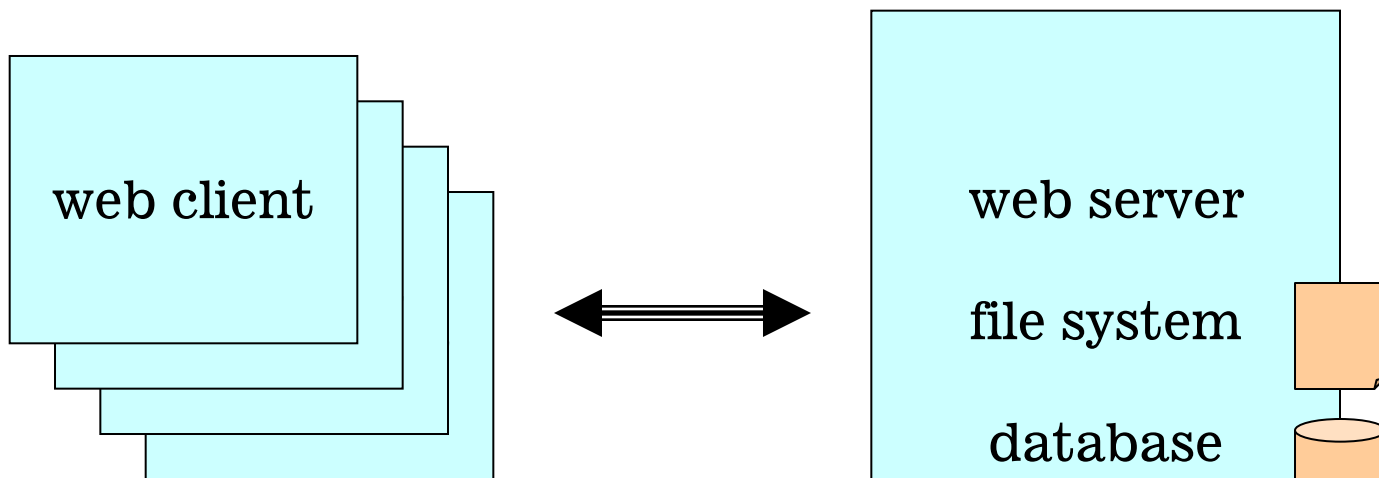


# GUI usando datacenter





# Arquitetura web clássica



A screenshot of a web browser window titled "VBMcgi tutorial". The address bar shows the URL `http://www.sbvb.com.br/cgi-bin/index_vbmcgi.cgi?p=17`. The page content includes HTML code at the top, followed by a form titled "A form with many kinds of inputs:". The form contains five sections:

- 1) **textbox:** "Enter your name:" followed by a text input field with the placeholder text "name".
- 2) **textarea (scrolling text box):** "Enter your opinion about something:" followed by a text area with the placeholder text "Some opinion".
- 3) **checkbox:** "You like:" followed by three checked checkboxes: "Sports", "Books", and "News".
- 4) **radio button:** "After dinner you:" followed by four radio buttons: "Brush your teeth", "Watch TV", "Study" (selected), and "Read a book".
- 5) **drop-down (also known as combo-box):** "Your favorite color is:" followed by a dropdown menu showing "Green".

At the bottom of the form are two buttons: "send" and "clear".





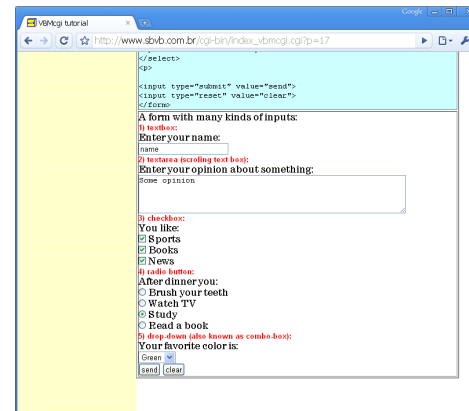
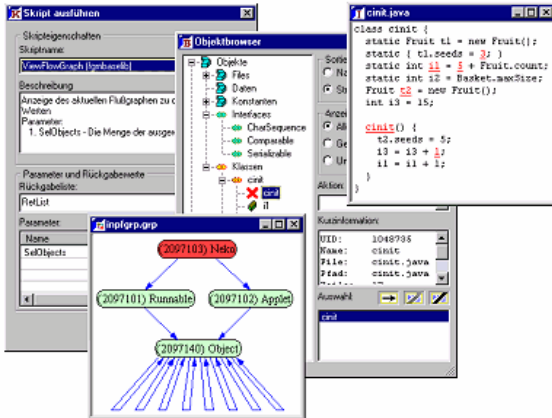
# GUI X web

## • GUI

- vantagens
  - cliente mais sofisticado
- desvantagens
  - mais difícil de desenvolver
  - mais difícil de manter os usuários atualizados (requer ferramenta adicional, desenvolvida a parte).
  - developer tem que resolver problema de concorrência de usuários

## • WEB

- vantagens
  - mais fácil de se desenvolver (desenvolve-se por cima do web server e do web client)
  - uma vez desenvolvido, o mundo inteiro pode ter acesso facilmente
  - implicitamente está resolvido o problema do upgrade do sistema; basta fazer upload da nova versão para o server
- desvantagens
  - cliente menos sofisticado (imagine o PhotoShop na web ...)





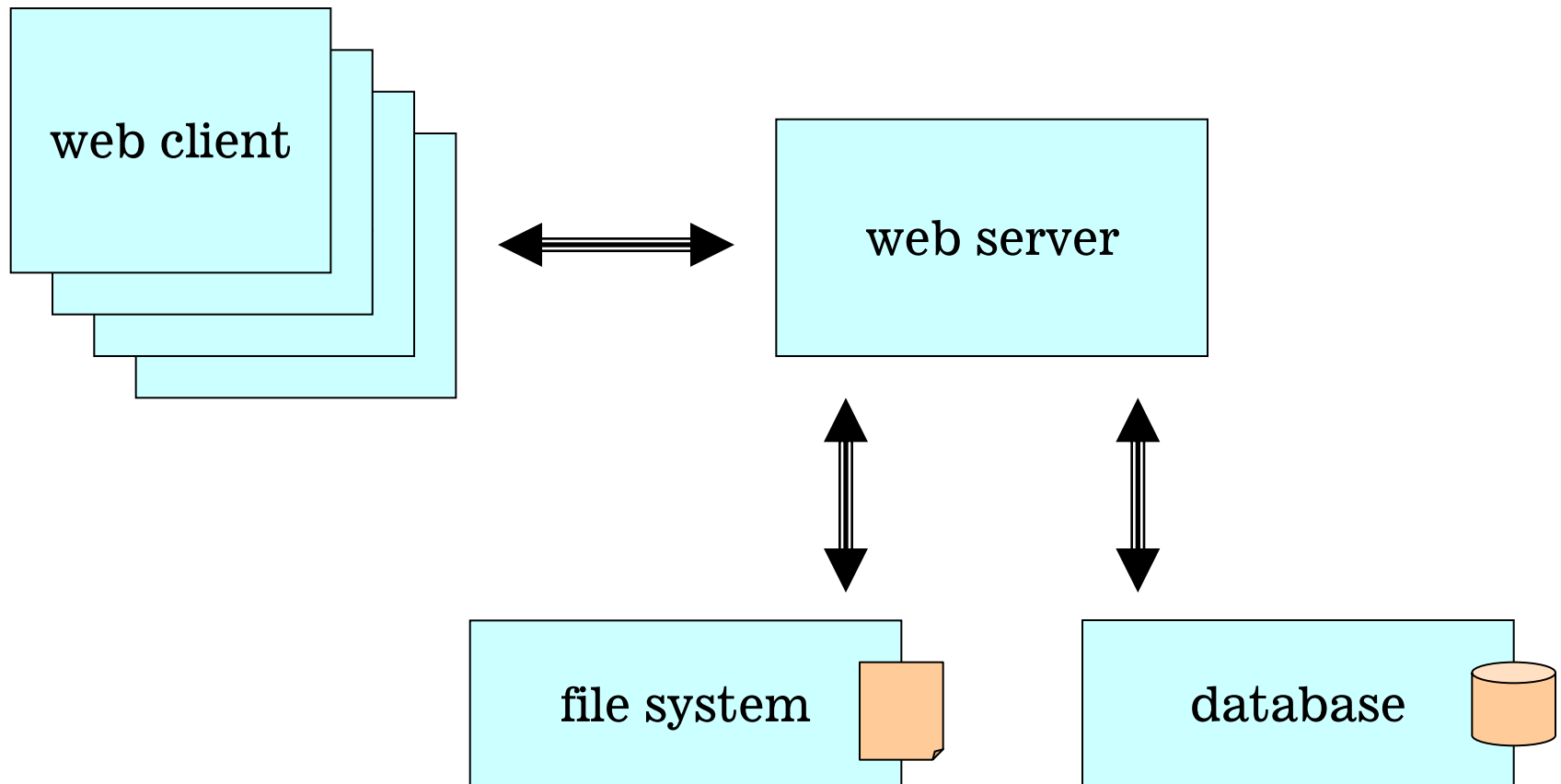
# web client side

- Ultimamente tem ocorrido um grande aumento da sofisticação do software web client side.
- A “guerra dos browsers” continua
  - Firefox (derivado do Mozilla)
  - Google Chrome
  - Internet Explorer
  - Safari (do Mac)
  - Opera
  - Navegadores de celular
- O javascript torna-se mais sofisticado.
  - Bibliotecas como JQuery permitem bonitos e poderosos efeitos client side, compatível com todos os navegadores.



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# Separando o file system e o database

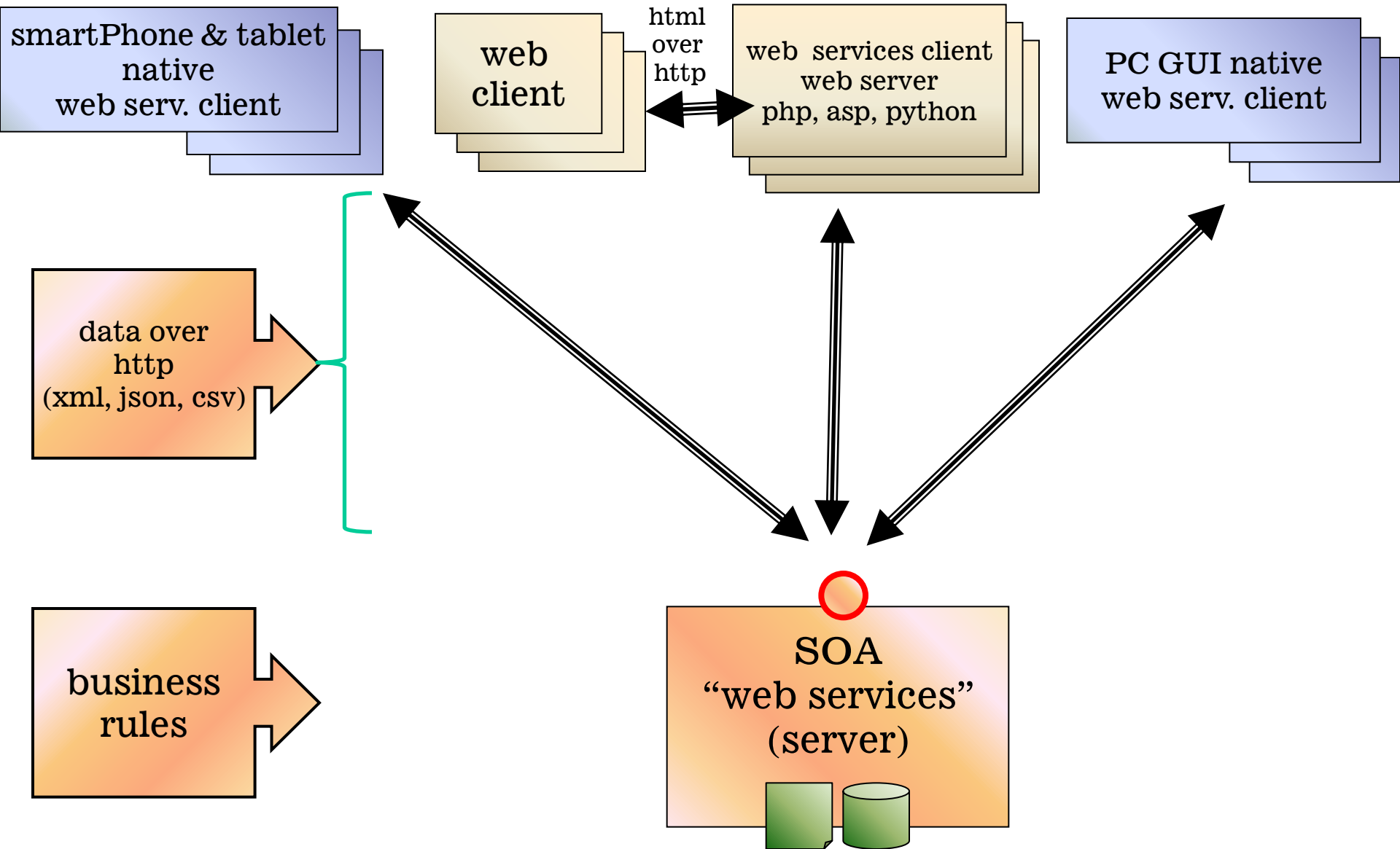




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# SOA-MC

## SOA multiple client

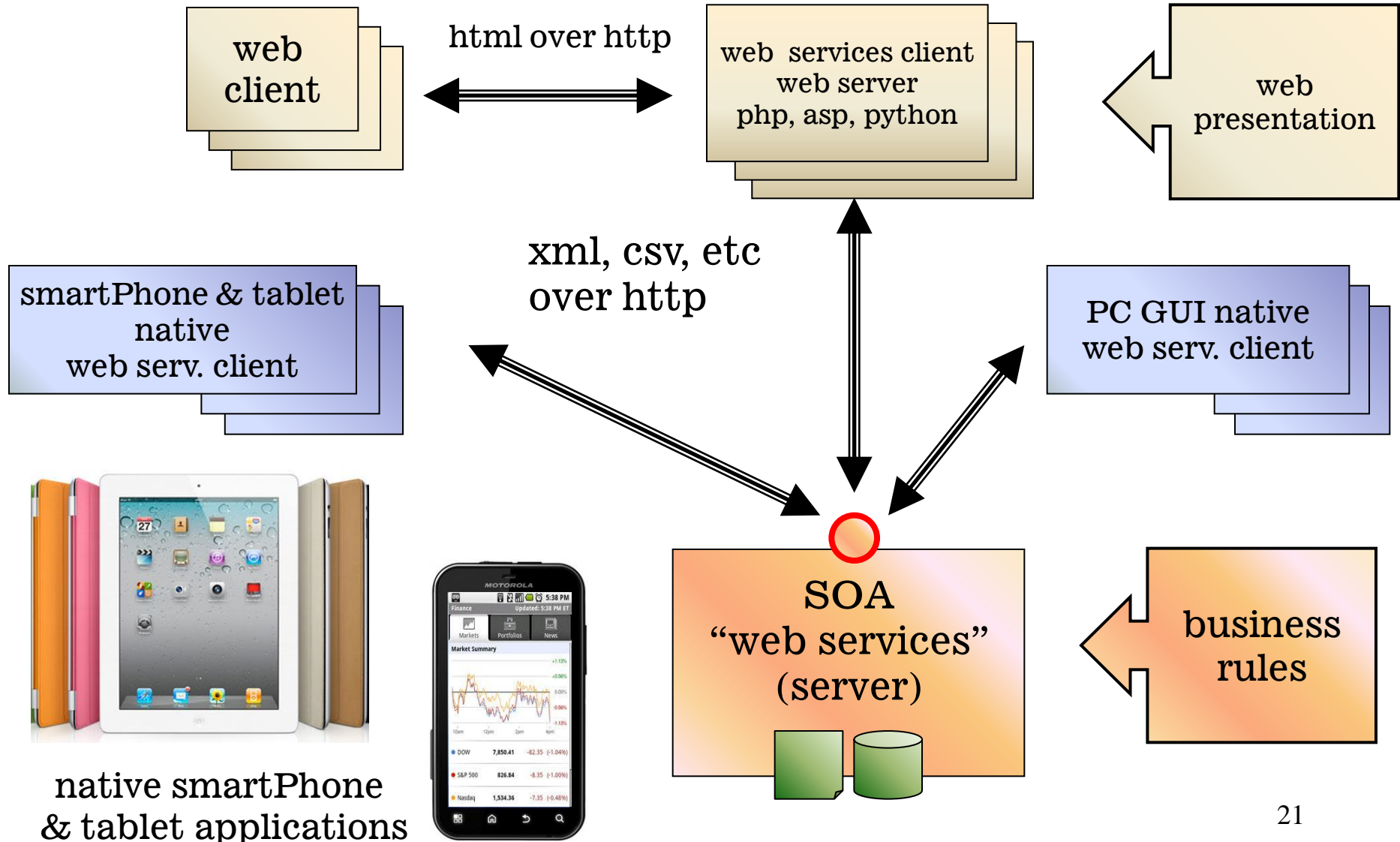




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# SOA-MC

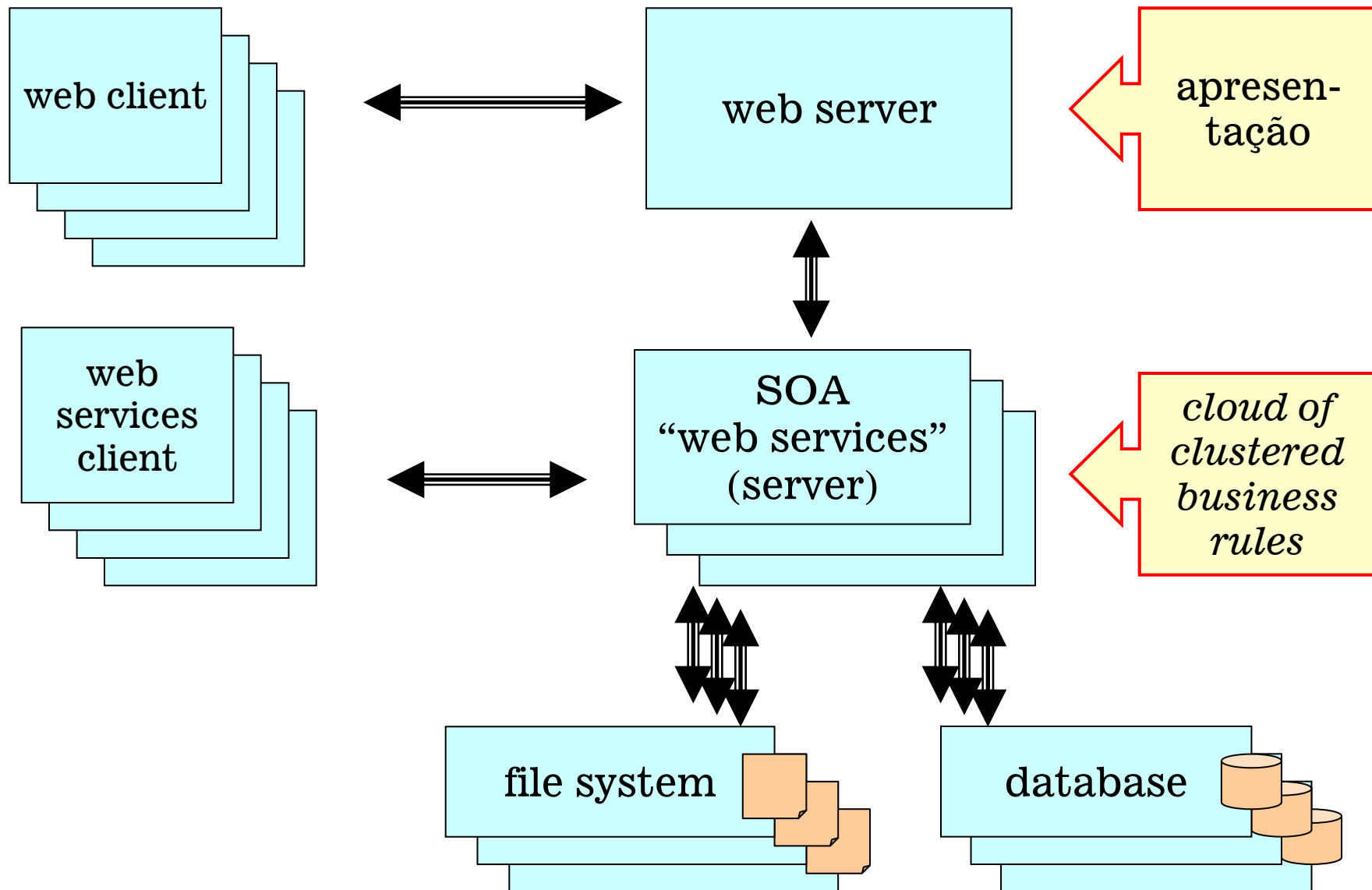
## SOA multiple client





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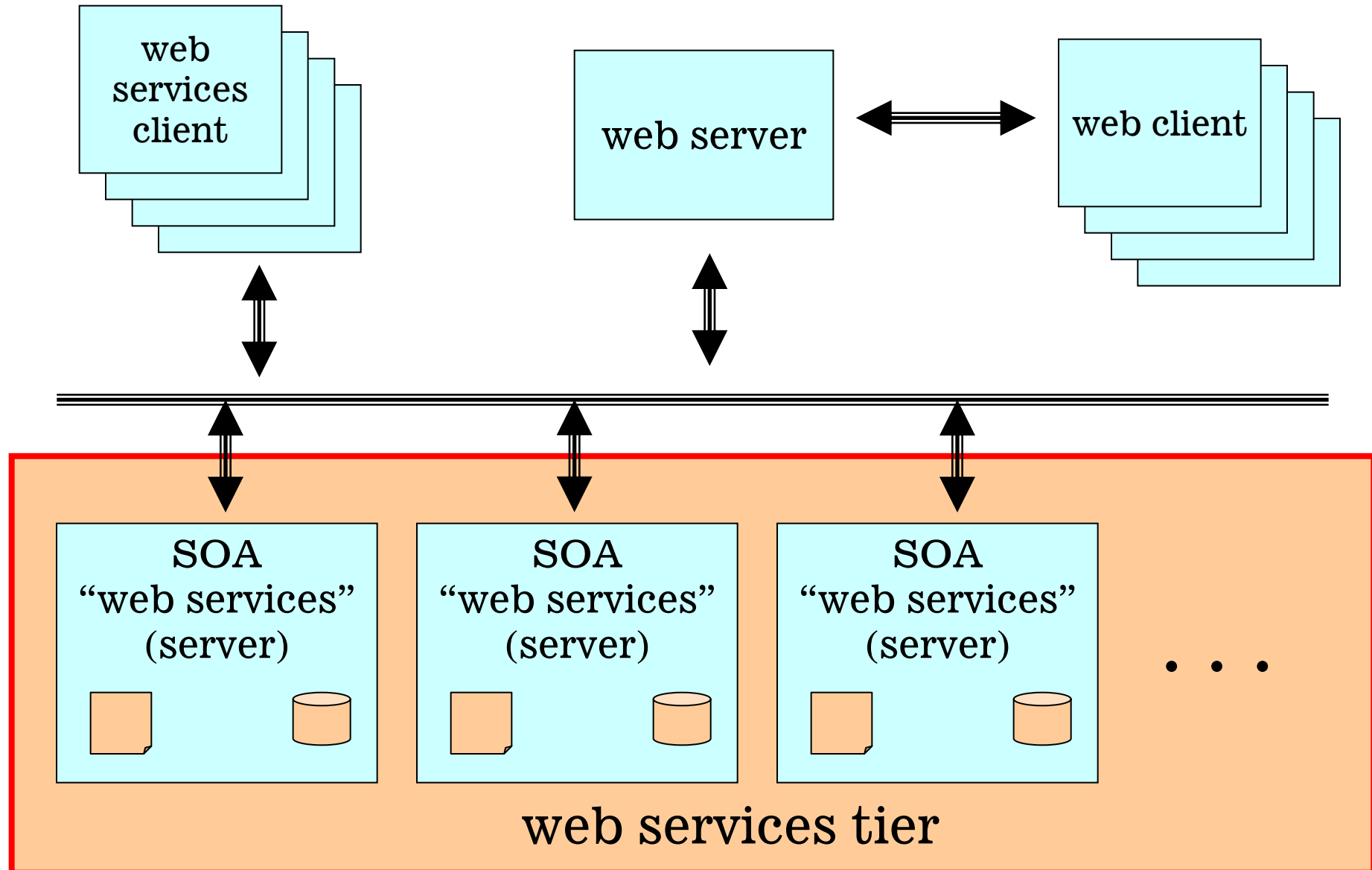
# Clusterizando a camada separada de regras de negócio





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# Barramento de serviços (web services tier)





- BPEL = Business Process Execution Language é a versão abreviada de WS-BPEL (Web Services BPEL), proposto pela OASIS (<http://www.oasis-open.org/>)
- Interações web service (ambas podem ser modeladas por ws-bpel)
  - executável
  - abstrata





- BPMN = Business Process Modeling Notation
- jBPMN, do jboss
- descrição de workflow



# The five layer TCP/IP model (actually used)

## 5 - Application tier

DHCP • DNS • FTP • HTTP • IMAP4 • IRC • MIME • POP3 • SIP • SMTP • SNMP •  
SSH • TELNET • BGP • RPC • RTP • RTCP • TLS/SSL • SDP • SOAP • L2TP • PPTP  
RIP, OSPF

} Java or C++  
app

## 4 - Transport tier

TCP • UDP • DCCP • SCTP • GTP

## 3 - Network tier

IP (IPv4 • IPv6) • ARP • RARP • ICMP • IGMP • RSVP • IPSec

} kernel  
of OS

## 2 - Data link tier

ATM • DTM • Ethernet • FDDI • Frame Relay • GPRS • PPP

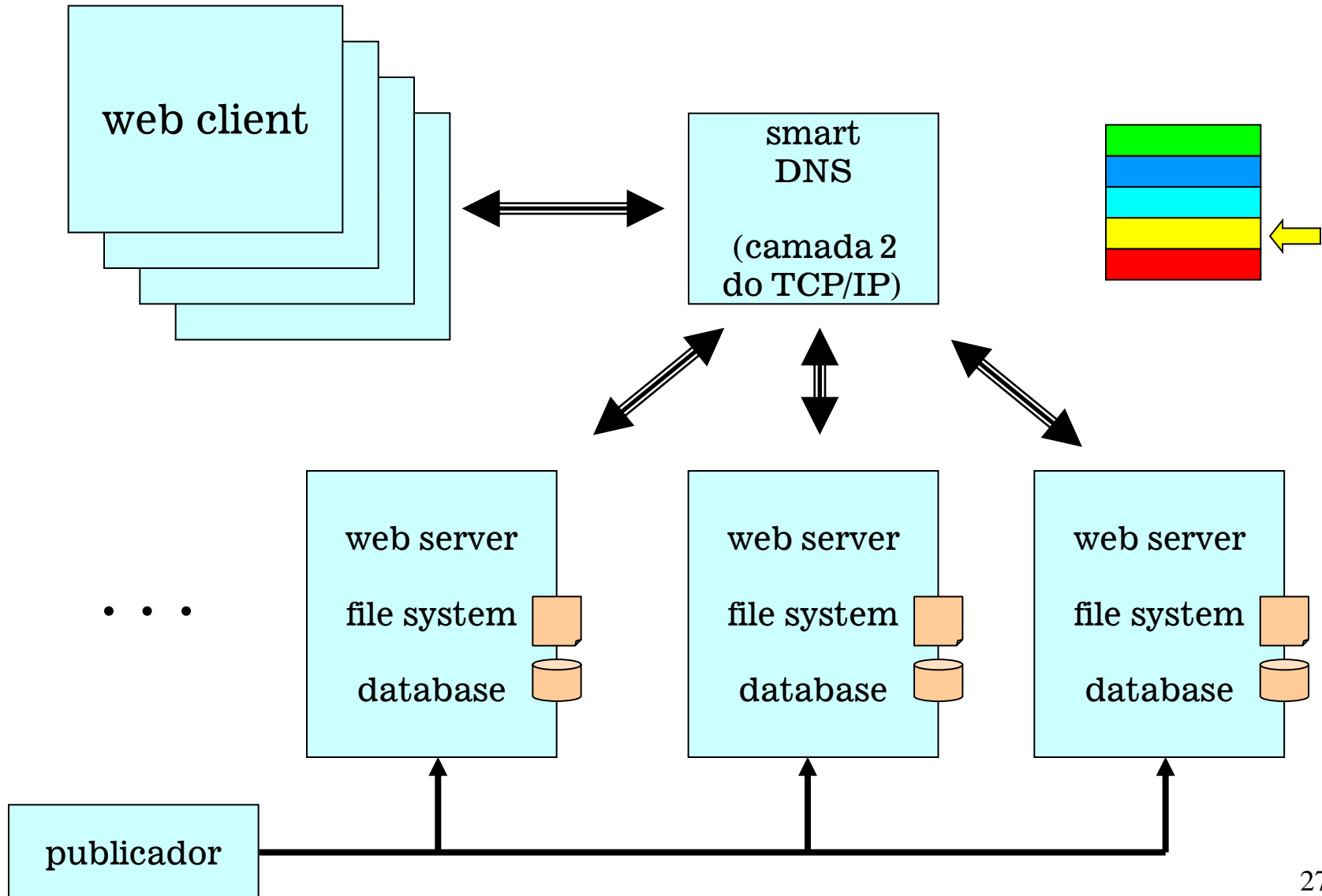
## 1 - Physical tier

Ethernet physical layer • ISDN • Modems • PLC • RS232 • SONET/SDH • G.709 • Wi-Fi

} hardware  
(& firmware)

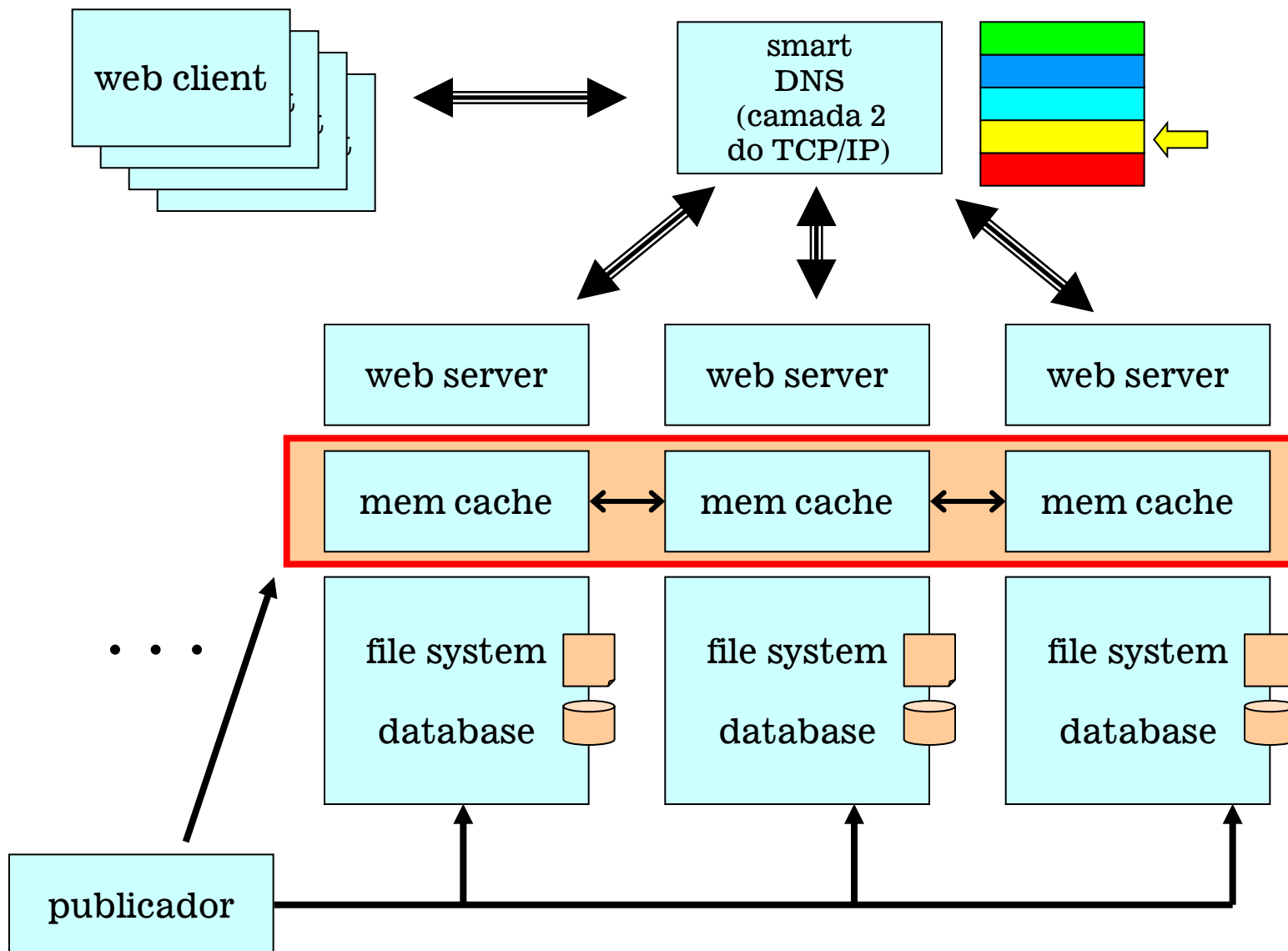


# Arquitetura para alto tráfego e apenas leitura





# Arquitetura para alto tráfego e apenas leitura com mem cache





# DNS que coloca o datacenter fisicamente perto do cliente

- É o que a google faz

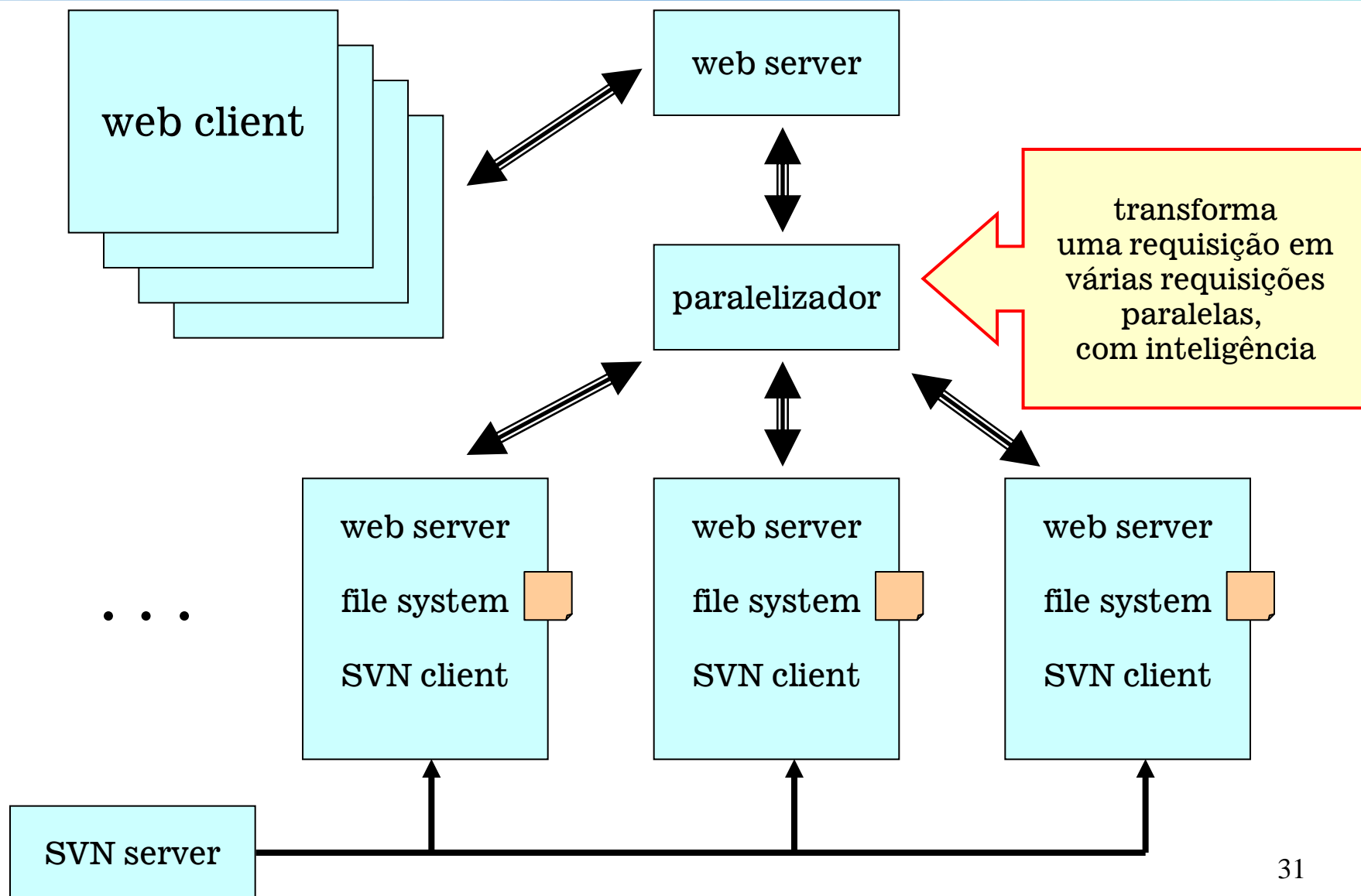


# Multiplicando a camada de regras de negócio

- onde implementar as regras de negócio?
  - em stored procedures no banco de dados
  - em código java, no servidor de aplicação (e.g. jboss).



# Arquitetura para consulta paralela



A large, light blue rounded rectangle with a dark blue border and a 3D effect. Two blue arrows point to the right from the right side of the rectangle, one above the other.

SOA, SOAP e  
Web Services





# SOA

- SOA = *Service Oriented Architecture*
- A idéia é “quebrar” um sistema grande em módulos independentes, que se comunicam com protocolo http.
- Pelo fato de ser baseado em http, tudo ocorre pela porta 80, que muitas vezes está liberada no firewall.
  - Existe opção de uso de https para protocolo seguro
- Cada módulo corresponde a um “serviço”, que pode ser definido por uma api.
- Quem usa o serviço precisa apenas entender e usar a api.
  - Os detalhes técnicos internos de como o serviço é implementado, incluindo a tecnologia empregada (e.g. linguagem de programação, sistema operacional) são irrelevantes para quem usa o serviço.



# SOAP

- Originalmente: *Simple Object Access Protocol*



# SOA: XML or not XML ?

- Há opções na definição de web services. Uma das opções é usar ou não XML para transportar as mensagens.
- Se XML é usado, o SOA é SOAP.
- Vantagem de usar XML:
  - É uma forma estruturada de enviar e receber dados, compatível com unicode.
  - Pelo fato de o XML ser estruturado, no caso de manutenção do sistema pode-se acrescentar especificação (novas tags), sem que se perca compatibilidade com serviços já implantados.
- Desvantagem de usar XML:
  - O uso de XML requer parseamento, o que consome potência computacional, isto é, reduz o desempenho.
  - Sem a estruturação do XML, é preciso que se gerencie a manutenção do sistema (acréscimo de especificação)

# Ambiente econômico e modelo de negócios

- Mudanças no ambiente podem levar um negócio a tornar-se inconsistente.
  - Exemplo: iluminação a gás tornou-se obsoleta com a iluminação elétrica. Outro: carroça/cavalo como meio de transporte tornou-se obsoleto com o automóvel.



evolução



evolução

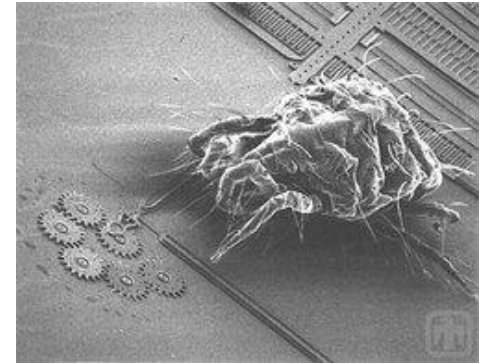
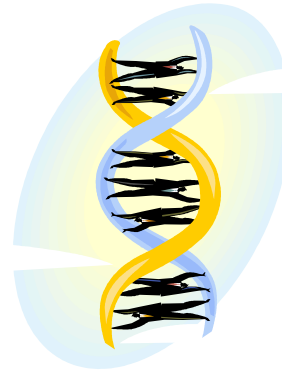




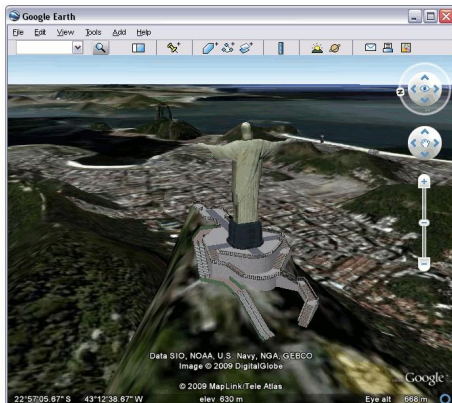
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# Algumas das inovações que provocam forte impacto no ambiente econômico

- Robótica, TI e segurança da informação, genética, nanotecnologia



- Internet / Web / Google Earth, tablets, smartPhones, novos materiais.





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# Internet e web ainda são importantes inovações

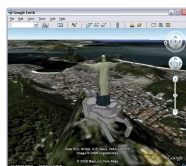
- Internet  $\supset$  web.
- Acesso a web por smartPhone é agora grande público, que aprecia navegar com site desenhado para smartPhone.

## Internet

email, ftp, google earth, VOIP, skype, IPTV, telnet, ssh, kazaa, p2p, Instant Messenger, video stream, etc.



TortoiseSVN



## web

(<http://www...>)

Navegadores web: Internet Explorer, Firefox, chrome, Safari, navegadores de smartPhone.

Páginas web: Google, submarino, amazon, ebay, etc.

amazon.com



ebay

Google







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# mobile (smartPhones & tablets) são inovações destacadas

- Tablets são importante inovação, considerados como um caso particular de smartPhone.
- Páginas web podem ser otimizadas para visualização via smartPhone / tablet.
- Aplicações nativas para smartPhone produzem melhor experiência para o usuário que acesso a web.

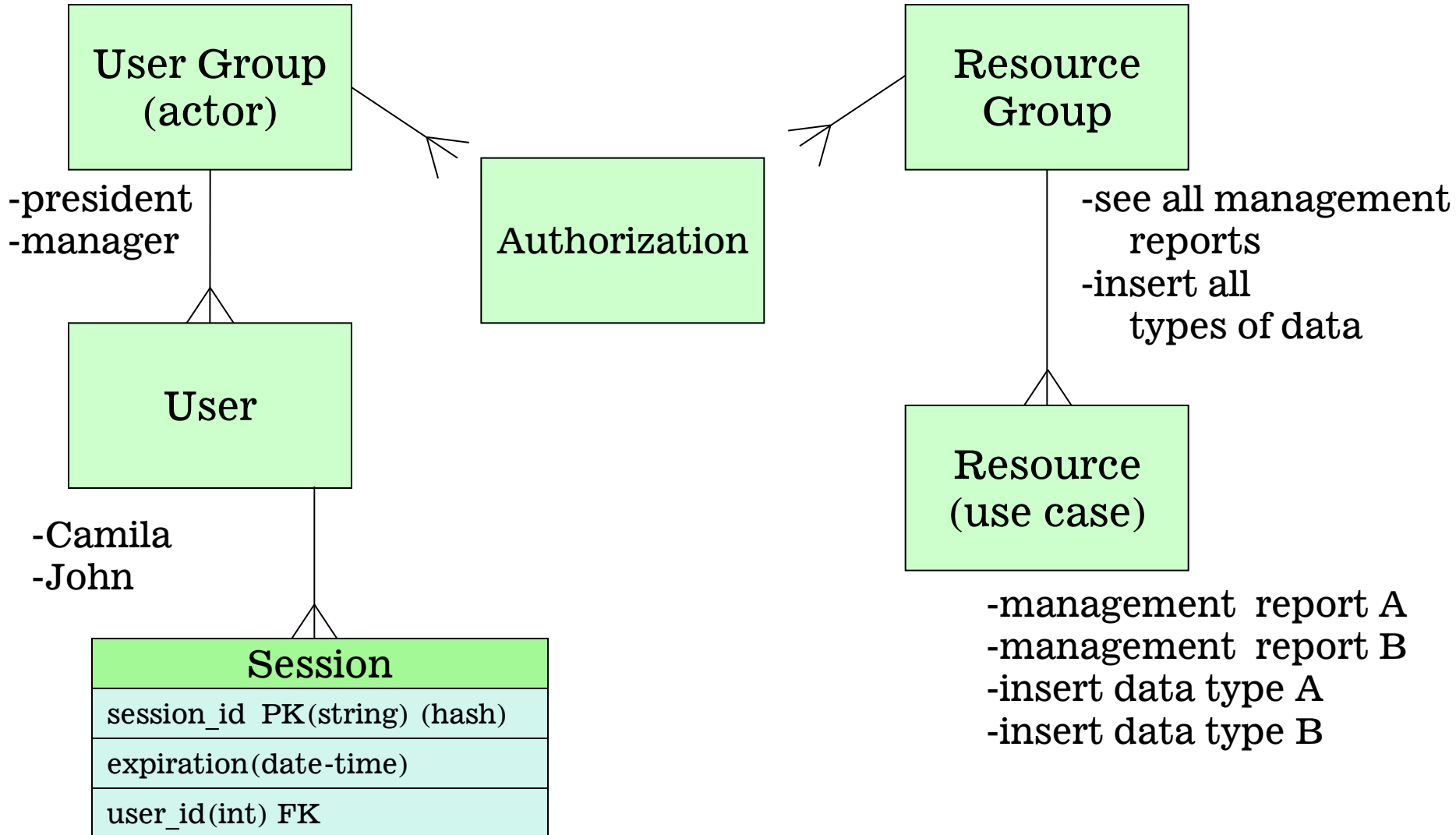




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# DOUA

## Database Orientad Usecase Authorization







# SOA-MC and DOUA

- SOA\_MC

- <http://www.sbv.com.br/proposals/SOA-MC-sbv.com.br.pdf>


- DOUA

- <http://www.sbv.com.br/proposals/DOUA-sbv.com.br.pdf>



# DataBase

**DBMS (DataBase  
Management  
System)**

Two blue arrows pointing to the right, one above the other, positioned to the right of the DBMS text box.



# Database models

- There exist 5 major models of databases
  - Hierarchical
  - Network
  - Relational (uses PK, FK, SQL)
  - Object-relational
  - Object Oriented

Some examples

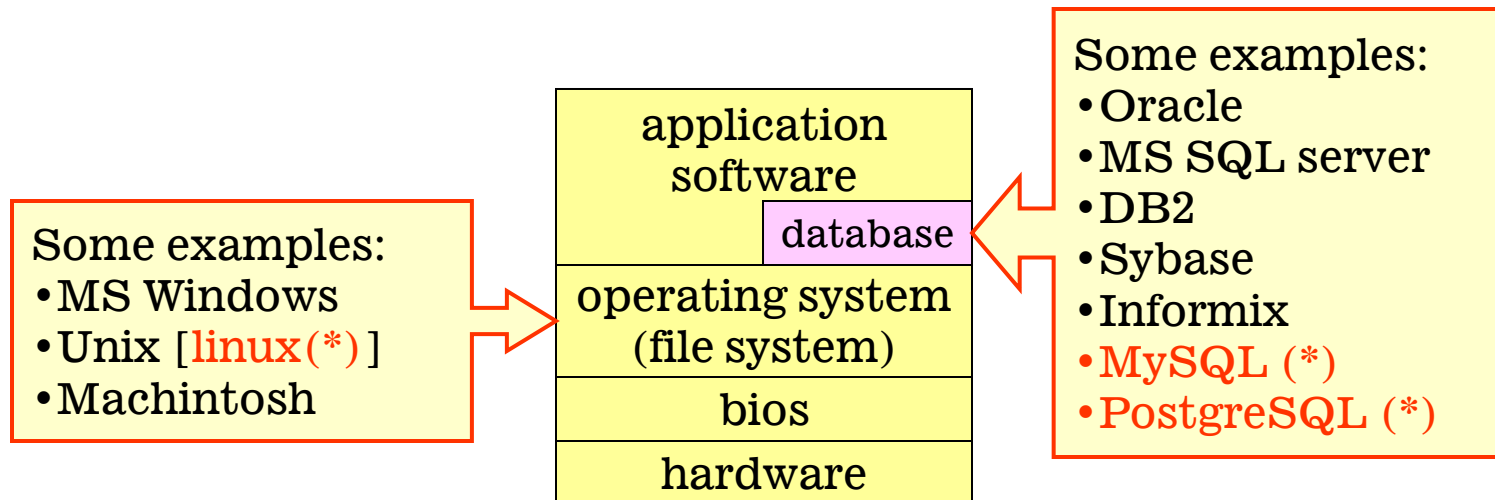
- Oracle
- MS SQL server
- DB2
- Sybase
- Informix
- MySQL (\*)
- PostgreSQL (\*)

(\*) free



# What is a database?

- DBMS (DataBase Management System) is a category of software that works as a tier in a software system.
  - The DBMS lies above the operating system (and the file system), and below the user application.
- The Structured Query Language (SQL), is a database query language that was adopted as an industry standard in 1986.
  - SQL is *not* a programming language, in the sense that you can't write a computer application in SQL; it is used to state commands to the DBMS.
- The application software is written in a programming language (such as C++ or Java).



(\*) free



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# PostgreSQL



# PostgreSQL



<http://www.postgresql.org/>



# Brief history of PostgreSQL (early moments)

- Ingres project at UC Berkeley. The project leader, Michael Stonebraker, had left Berkeley to commercialize Ingres in 1982, but eventually returned to academia.
  - After returning to Berkeley in 1985, Stonebraker started a post-Ingres project to address the problems with contemporary database systems that had become increasingly clear during the early 1980s. While they share many of the same ideas, the code bases of PostgreSQL and Ingres started (and remain) completely separated.
- 1986 – the team released a number of papers describing the basis of the system.
- 1988 – the project had a prototype version up and running, called “POSTGRES”.
- 1990 – version 2.
- 1991 – version 3.
- 1993 – version 4.2 (last version as a research project of Berkeley).
- 1995 – Andrew Yu and Jolly Chen release version 5 “Postgre95”, open-source, 100% ANSI C.



# Brief history of PostgreSQL (late moments)

- 1996 – Name change from Postgres95 to PostgreSQL, also known as version 6.
- 2000 – version 7 (Foreign keys, SQL92 syntax for joins, etc.)
- 2005 – version 8.0. Native server on Microsoft Windows, savepoints, tablespaces, exception handling in functions, point-in-time recovery.
- 2010 – version 9.0. Built-in binary streaming replication, Hot standby, 64-bit Windows, per-column triggers and conditional trigger execution, exclusion constraints, anonymous code blocks, named parameters, password rules
- 2011 – version 9.1. Synchronous replication, per-column collations, unlogged tables, K-nearest-neighbor indexing, serializable snapshot isolation, writeable common table expressions, SE-Linux integration, extensions, SQL/MED attached tables (Foreign Data Wrappers), triggers on views



# Basic operations (using console)



- creation of user “root”

```
[root]$ su postgres
```

```
[postgres]$ createuser root
```

```
Shall the new user be allowed to create databases? (y/n) y
```

```
Shall the new user be allowed to create more new users? (y/n) y
```

```
CREATE USER
```

- creation of user “sbvb” (myuser)

```
[root]$
```

```
[root]$ createuser -P sbvb
```

```
Enter password for new user:
```

```
Enter it again:
```

```
Shall the new user be allowed to create databases? (y/n) n
```

```
Shall the new user be allowed to create more new users? (y/n) n
```

```
CREATE USER
```





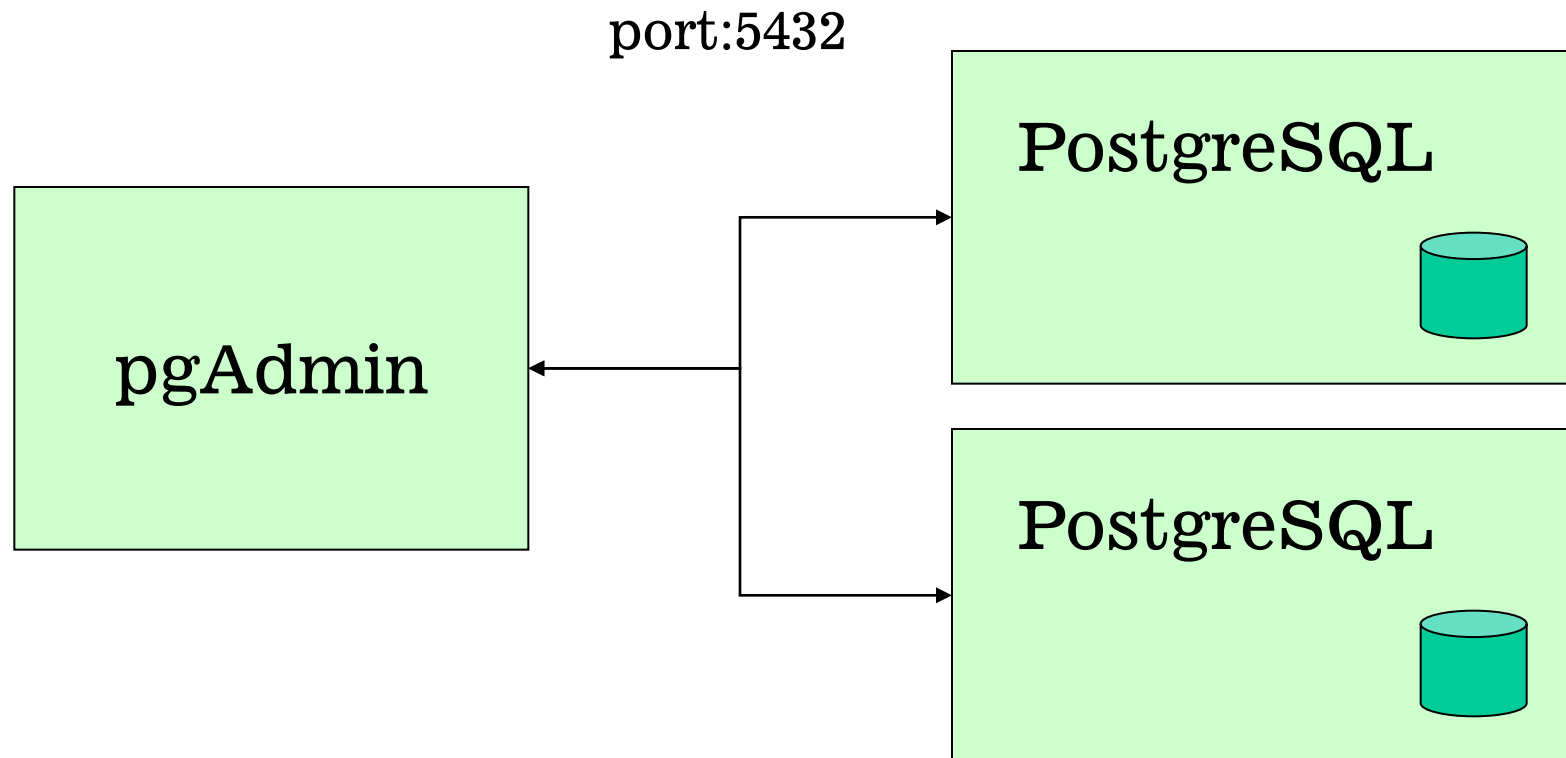
# Basic operations (using console) (2)



- Creation / deletion of a database
  - `$ createdb db_sbVB owner=sbvb`
  - `$ dropdb db_sbVB`
- Entering the database console, from user sbvb
  - `$ psql db_sbVB`
- Enter as user sbvb to database db\_bib
  - `psql -U sbvb db_bib`
- See more details in the chapter “Getting Started” of manual



# Administering databases





# Since PostgreSQL version 8.x supports unicode!



- Not only data, but also table names or column names can be unicode.
- User application destined to any place in the world can be developed with PostgreSQL, even if it is required to use non-western letters such as Japanese or Chinese.
- 日本語 (Japanese) ok
- 中文 (Chinese) ok
- (any language of the world) ok



# SQL





# Tables for data

- The data lies in tables

TableName
Col_1 (type)
Col_2 (type)
Col_3 (type)
Col_4 (type)

design view

TableName			
Col_1	Col_2	Col_3	Col_4
data	data	data	data
data	data	data	data
data	data	data	data
data	data	data	data
data	data	data	data

data view



# Tables (2)

- Table example

tb_store	
Name (string)	
Sales (real)	
LastReport (date)	

design view

tb_store		
Name	Sales	LastReport
Rio de Janeiro	1200.0	26/08/2003
São Paulo	2000.0	20/08/2003
Paraná	1000.0	1/08/2003
Brasília	800.0	1/07/2003

data view



# select

- Assuming that is data already stored in the database tables, one can get information about it by using the SQL command “select”.
- The syntax is

```
select column[,column] from table
```
- Your application can send to the database a select command, and it will produce an anonymous table in the database with the answer. Then, you can scan this anonymous table and use it for your purposes. Example:

```
select Name from tb_store
```

(anonymous)
Name
Rio de Janeiro
São Paulo
Paraná
Brasília

```
select Name,Sales from tb_store
```

(anonymous)	
Name	Sales
Rio de Janeiro	1200.0
São Paulo	2000.0
Paraná	1000.0
Brasília	800.0



# select syntax

```
select "column1" [, "column2", etc]
  from "tb_tablename"
  [where "condition"];

[] = optional
```

- The column names that follow the select keyword determine which columns will be returned in the results. You can select as many column names that you'd like, or you can use a "\*" to select all columns.
- The table name that follows the keyword from specifies the table that will be queried to retrieve the desired results.
- The where clause (optional) specifies which data values or rows will be returned or displayed, based on the criteria described after the keyword "where".





# insert

- todo



# Learning more about SQL

- Links
  - <http://www.1keydata.com/>
  - <http://www.sqlcourse.com/>
  - <http://www.sqlcourse2.com/>
  - <http://www.baycongroup.com/tocsql.htm>
- PostgreSQL's help



# Practice basic SQL functions

- See examples of chapter 2 of manual.
- See that you get familiar with the concepts below
  - Creation / deletion of tables
  - Populate tables with data (insert)
  - Query tables (select)
  - Join among tables (complex queries)
  - Aggregated functions (max, min, like, etc.)
  - Managing data
    - Update / deletion of table's data



# Advanced SQL functions of PostgreSQL

- Views (as alias of a select)
- Foreign keys
- Array



# inheritance



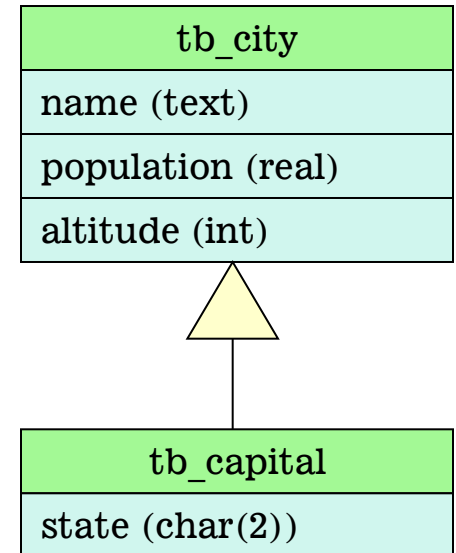
A diagram illustrating inheritance. It features a large, light blue rounded rectangle with a dark blue border. Inside this rectangle, the word 'inheritance' is written in a black serif font. To the right of the rectangle, there are two blue arrows pointing to the right, one above the other, suggesting a flow or continuation of the concept.

inheritance



# inheritance of tables

```
CREATE TABLE tb_city (  
  name text,  
  population real,  
  altitude int -- (in mt)  
);  
  
CREATE TABLE tb_capital (  
  state char(2)  
) INHERITS (tb_city);  
  
INSERT INTO tb_city (name, population, altitude)  
  VALUES ('Petrópolis', 2000, 1500);  
INSERT INTO tb_city (name, population, altitude)  
  VALUES ('Teresópolis', 2500, 1800);  
  
INSERT INTO tb_capital (name, population, altitude, state)  
  VALUES ('Rio de Janeiro', 8000, 2, 'RJ');  
INSERT INTO tb_capital (name, population, altitude, state)  
  VALUES ('São Paulo', 16000, 1650, 'SP');
```





# Both tables

	name text	population real	altitude integer	state character(2)
1	Rio de Janeiro	8000	2	RJ
2	São Paulo	16000	1650	SP

← tb\_capital

	name text	population real	altitude integer
1	Petrópolis	2000	1500
2	Teresópolis	2500	1800
3	Rio de Janeiro	8000	2
4	São Paulo	16000	1650

← tb\_city



# MySQL

- `mysql -u root -p <rootpwd>`
- `mysql>CREATE DATABASE db_hello`
  - `DEFAULT CHARACTER SET utf8`
  - `DEFAULT COLLATE utf8_general_ci;`
- `CREATE USER 'sbvb'@'localhost'`
  - `IDENTIFIED BY 'sbvbpwd';`
- `GRANT ALL PRIVILEGES ON *.* TO 'sbvb'@'localhost' WITH GRANT OPTION;`





# MySQL

- `mysql -u sbvb -p <sbvbpwd>`
- `connect db_hello;`
- `CREATE TABLE tb_varvalue(`
- `var VARCHAR(30) NOT NULL,`
- `PRIMARY KEY(var),`
- `value VARCHAR(300)`
- `);`
- `INSERT INTO tb_varvalue (var, value)`  
`VALUES('myvar', 'myvalue');`
- `select * from tb_varvalue;`



# Installing tools

A large, light blue button with rounded corners and a subtle gradient. It has a dark blue border and a right-pointing arrow on its right side. The text 'Installing tools' is centered on the button in a black, serif font.

Installing tools



# Installing mysql to ubuntu

- `sudo apt-get install mysql-server`
  - Login|pwd:root|rootpwd
- `sudo apt-get install mysql-client-5.5`
- `GRANT ALL PRIVILEGES ON *.* TO 'root'@'localhost';`
- `FLUSH PRIVILEGES;`
- `// check mysql status`
- `mysqladmin -u root -p status`



# Reset mysql pwd

- `// Stop the MySQL Server.`
- `sudo /etc/init.d/mysql stop`
  
- `// Start the mysqld configuration.`
- `sudo mysqld --skip-grant-tables --skip-networking &`
  
- `// Login to MySQL as root.`
- `mysql -u root mysql`
  
- `// Replace YOURNEWPASSWORD with your new password!`
- `UPDATE user SET Password=PASSWORD('YOURNEWPASSWORD')  
WHERE User='root'; FLUSH PRIVILEGES; exit;`
  
- `// test login to mysql with new pwd`
- `mysql -u root -p`
- `<newpwd>`



# Tools used to develop web services

- Operating system
  - Linux Ubuntu 12.04 x86\_64 kernel 3.2.0-34-generic
  - could be Windows or Mac
- Java kit (`$ java -version`)
  - java version "1.7.0"
  - Java(TM) SE Runtime Environment (build 1.7.0-b147)
  - Java HotSpot(TM) 64-Bit Server VM (build 21.0-b17, mixed mode)



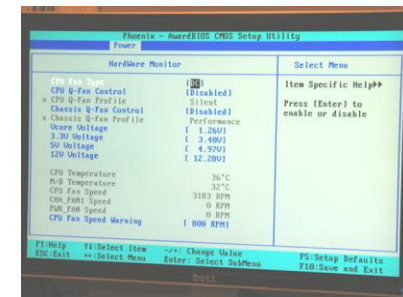
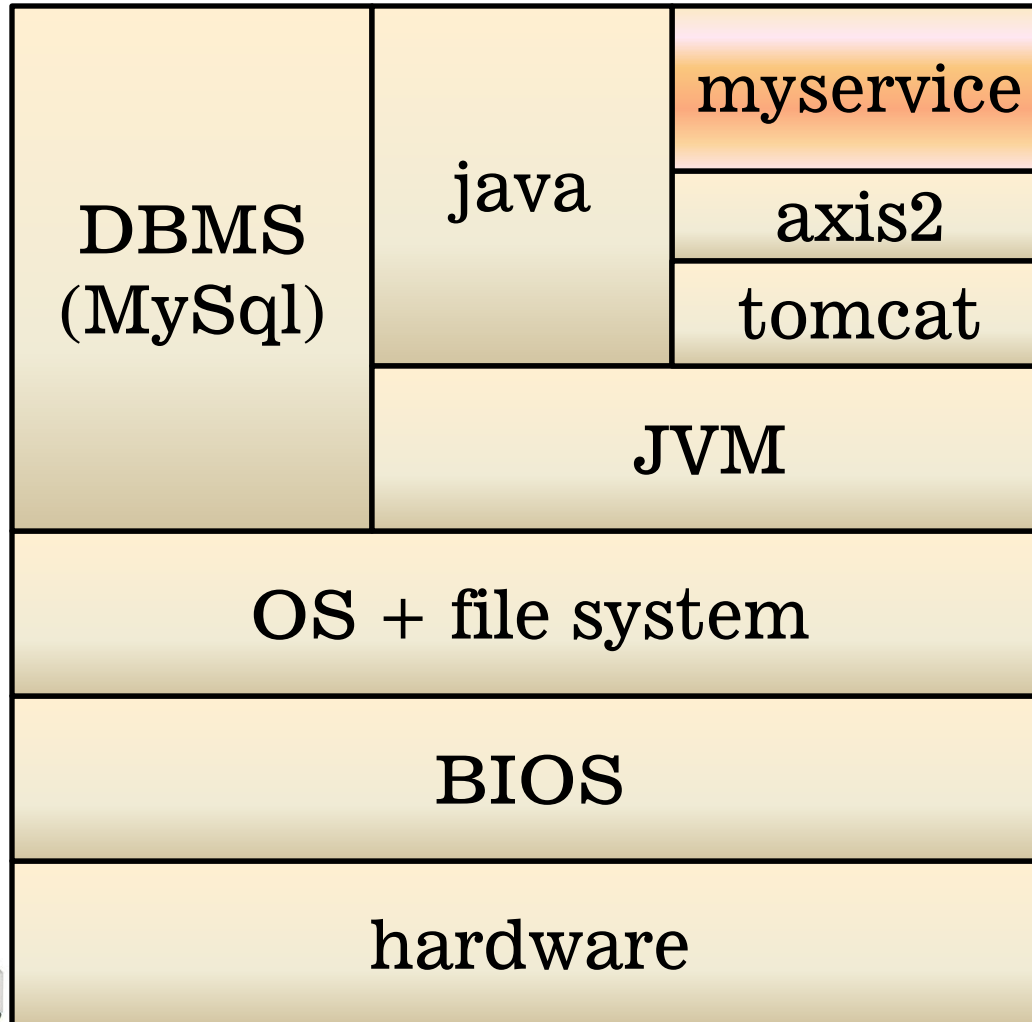
# Tools used to develop web services

- IDE
  - NetBeans 7.3, with axis2 plugin
- Libraries
  - Axis2 library version 1.6.2
- Database
  - PostgreSQL
  - mysql --version
    - Ver 14.14 Distrib 5.5.28



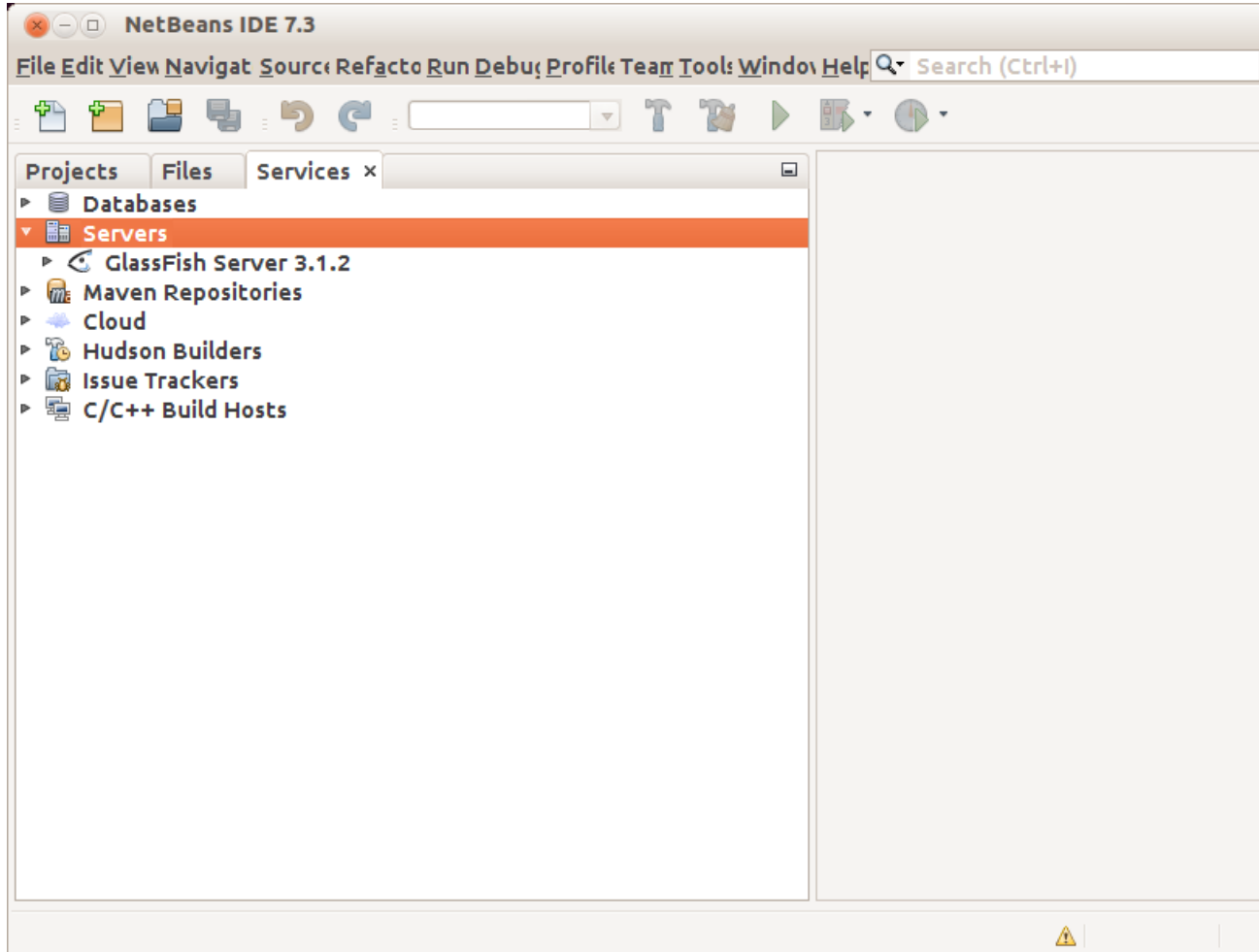
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# Software tiers





# Netbeans with Tomcat



right click on servers, choose add server





**Add Server Instance**

**Steps**

1. Choose Server
2. ...

**Choose Server**

**Server:**

- Apache Tomcat
- GlassFish Server 3+
- JBoss Application Server
- Oracle WebLogic Server

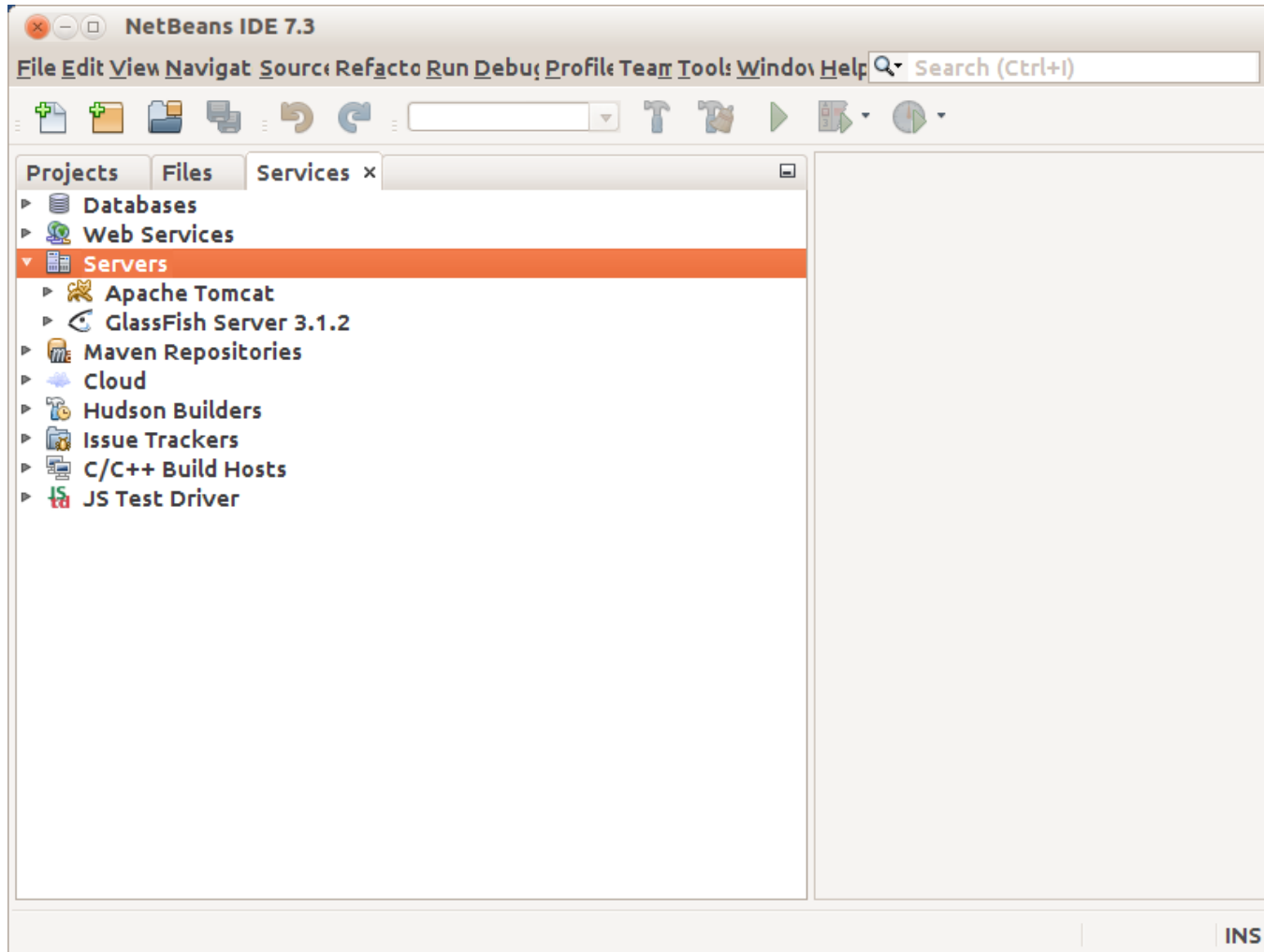
**Name:** Apache Tomcat

< Back   Next >   Finish   Cancel   Help



# Tomcat

- Setup NetBeans
  - <http://netbeans.org/kb/docs/websvc/gs-axis.html>
- Setup Tomcat 7.0.39
  - Download apache-tomcat-7.0.39.zip and expand it to a folder
  - `cd /home/sbvb/app/apache-tomcat-7.0.39/bin`
  - `chmod 755 *.sh`
  - `./startup.sh`
    - Look for “catalina\_home” with “`find / -name catalina -print`”. In my computer it is “`/usr/share/maven-repo/org/apache/tomcat/catalina`”
    - edit `conf/tomcat-users.xml`; add lines below
      - `<role rolename="manager-gui"/>`
      - `<user username="sbvb" password="sbvb_pwd" roles="manager-gui"/>`
    - `login|pwd = sbvb|sbvb_pwd`
    - `/home/sbvb/app/apache-tomcat-7.0.39/bin/startup.sh`
    - `/home/sbvb/app/apache-tomcat-7.0.39/bin/shutdown.sh`



Login | pwd: sbvb | sbvbpwd



# Make tomcat scripts executable

- Go to folder
- <tomcat>/bin
- Write
- `$ chmod 755 *.sh`



# Add manager-gui

- Add gui manager role.
  - In <tomcat>/conf/tomcat-users.xml
- `<user password="sbvbpwd" roles="admin,manager-gui" username="sbvb"/>`



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# Check Tomcat is working

http://localhost:8080

Apache Tomcat/7.0.39 - Google Chrome

Apache Tomcat/7.0.39 x


localhost:8080

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

## Apache Tomcat/7.0.39

The Apache Software Foundation  
<http://www.apache.org/>

If you're seeing this, you've successfully installed Tomcat.  
Congratulations!



**Recommended Reading:**

- [Security Considerations HOW-TO](#)
- [Manager Application HOW-TO](#)
- [Clustering/Session Replication HOW-TO](#)

Server Status  
Manager App  
Host Manager

**Developer Quick Start**

<a href="#">Tomcat Setup</a>	<a href="#">Realms &amp; AAA</a>	<a href="#">Examples</a>	<a href="#">Servlet Specifications</a>
<a href="#">First Web Application</a>	<a href="#">JDBC DataSources</a>		<a href="#">Tomcat Versions</a>

**Managing Tomcat**  
For security, access to the

**Documentation**  
Tomcat 7.0 Documentation

**Getting Help**  
FAQ and Mailing Lists



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# Check Tomcat is working

Web browser window showing the Tomcat Web Application Manager interface.

Address bar: <http://localhost:8080/manager/html>

The Apache Software Foundation  
<http://www.apache.org/>

Tomcat Web Application Manager

Message: OK

**Manager**

<a href="#">List Applications</a>	<a href="#">HTML Manager Help</a>	<a href="#">Manager Help</a>	<a href="#">Server Status</a>
-----------------------------------	-----------------------------------	------------------------------	-------------------------------

**Applications**

Path	Display Name	Running	Sessions	Commands
/	Welcome to Tomcat	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <input type="button" value="Expire sessions"/> with idle ≥ <input type="text" value="30"/> minutes



# Axis2

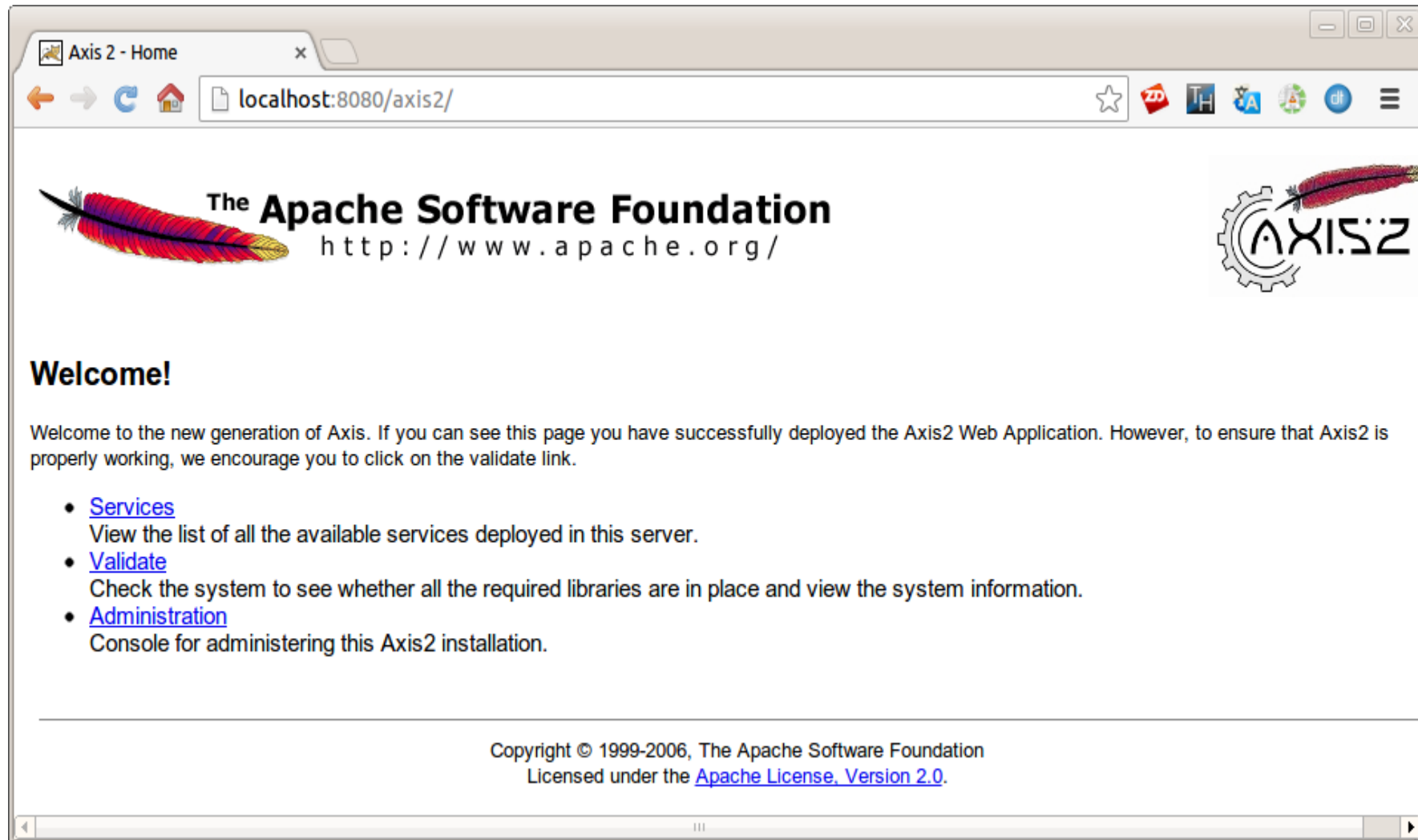
- Download axis2.war (axis2-1.6.2-war.zip)
  - <http://axis.apache.org/axis2/java/core/>
    - Download releases, war distribution
    - Copy axis2.war to <tomcat>/webapps
- Restart tomcat
- axis2 should appear as an application of tomcat. Click on it.





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# axis2 services under tomcat





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# Test web service on browser

CloudPowerSave\_Cloud - NetBeans IDE 7.3

File Edit View Navigate Source Refactor Run Debug Profile Team Tools Window Help

Search (Ctrl+I)

Projects x Services

- CloudPowerSave
  - Source Packages
  - Libraries
  - CloudPowerSave\_Cloud
    - Source Packages
      - cloud
        - CloudWS.java
        - CustomerDAO.java
        - Globals.java
        - MeasureDAO.java
        - MeasureDataBundleDAO.java
      - model
    - Axis2 Web Services
      - CloudWS
        - hello: String
        - createCustomer: Boolean
        - retrieveCustomer: List
        - updateCustomer: Boolean
        - deleteCustomer: Boolean
        - createMeasure: Boolean
        - retrieveMeasure: List
        - updateMeasure: Boolean
        - deleteMeasure: Boolean
        - setMeasureDataBundle: Boolean
        - retrieveMeasureDataBundle: List
    - Libraries
      - mysql-connector-java-5.1.20-bin.jar
      - JDK 1.7 (Default)
    - c-scientific
    - mini web cam
    - sbVB\_java\_course
  - HTTP Server Monitor

cloudWS.java x

```
16 public class CloudWS {
17
18     // http://localhost:8080/axis2/service
19     public String hello(String name) {
20         return "Hello " + name;
21     }
22
23     //public Boolean createCustomer(Custom
24     public Boolean createCustomer(String
```

CloudWS

Output x

- CloudPowerSave\_Cloud (axis2-deploy) x
- Apache Tomcat Log x
- Apache Tomcat x

```
Apr 17, 2013 12:38:48 PM org.apache.catalina.startup.HostConfig deployD
INFO: Deploying web application directory /home/sbvb/Dropbox/app/apache
Apr 17, 2013 12:38:48 PM org.apache.coyote.AbstractProtocol start
INFO: Starting ProtocolHandler ["http-bio-8080"]
Apr 17, 2013 12:38:48 PM org.apache.coyote.AbstractProtocol start
INFO: Starting ProtocolHandler ["ajp-bio-8009"]
Apr 17, 2013 12:38:48 PM org.apache.catalina.startup.Catalina start
INFO: Server startup in 2516 ms
```

18 | 67 | INS



# Definitions

- POJO = *Plain Old Java Object*
  - The name is used to emphasize that a given object is an ordinary Java Object, not an Enterprise JavaBean, nor a DTO.



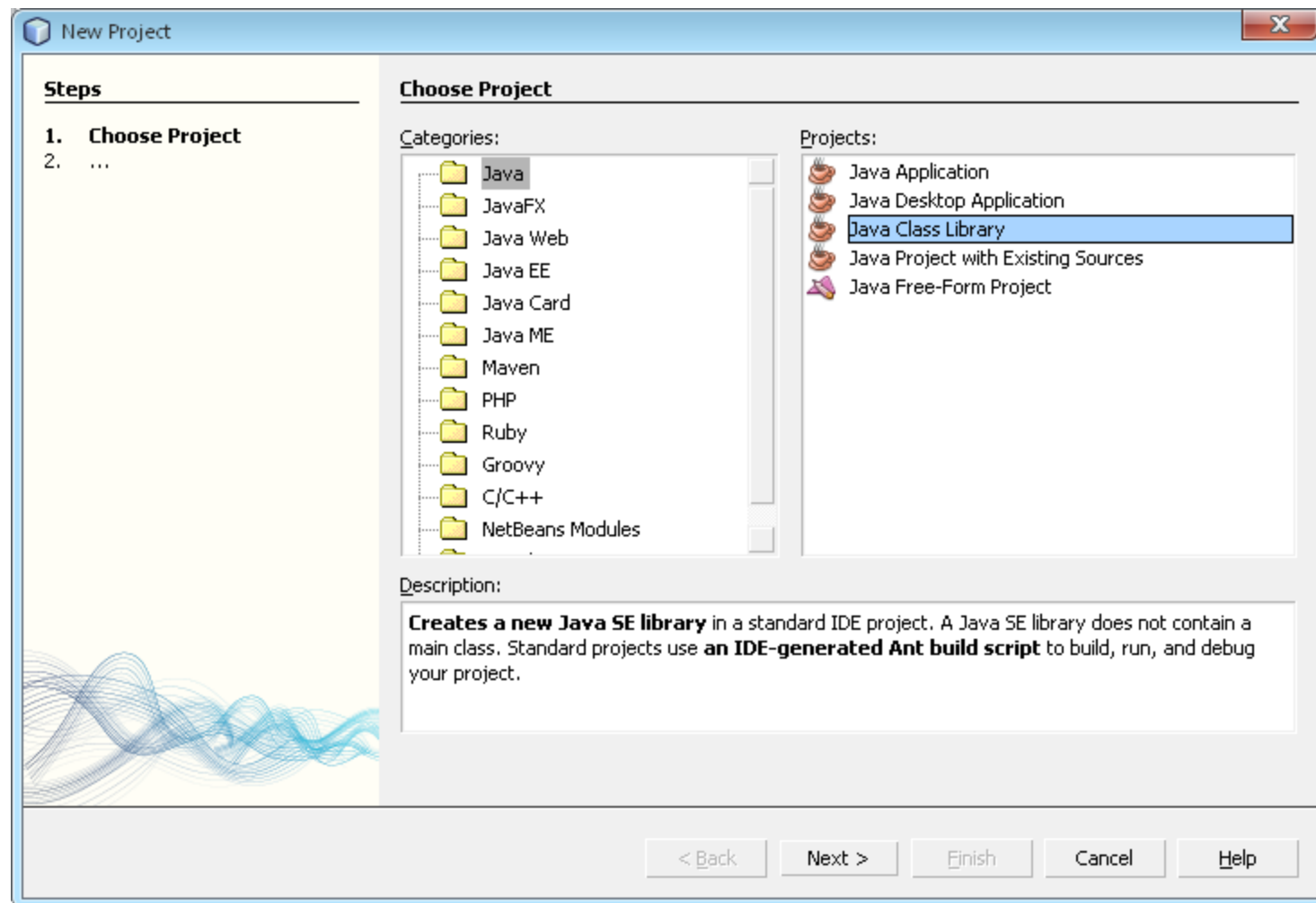
# References

- [http://ws.apache.org/axis2/1\\_2/pojoguide.html](http://ws.apache.org/axis2/1_2/pojoguide.html)
- <http://www.agileskills2.org/DWSAA/v20pub/FourtySixPages.pdf>
- <http://netbeans.org/kb/docs/web-svc/gs-axis.html>



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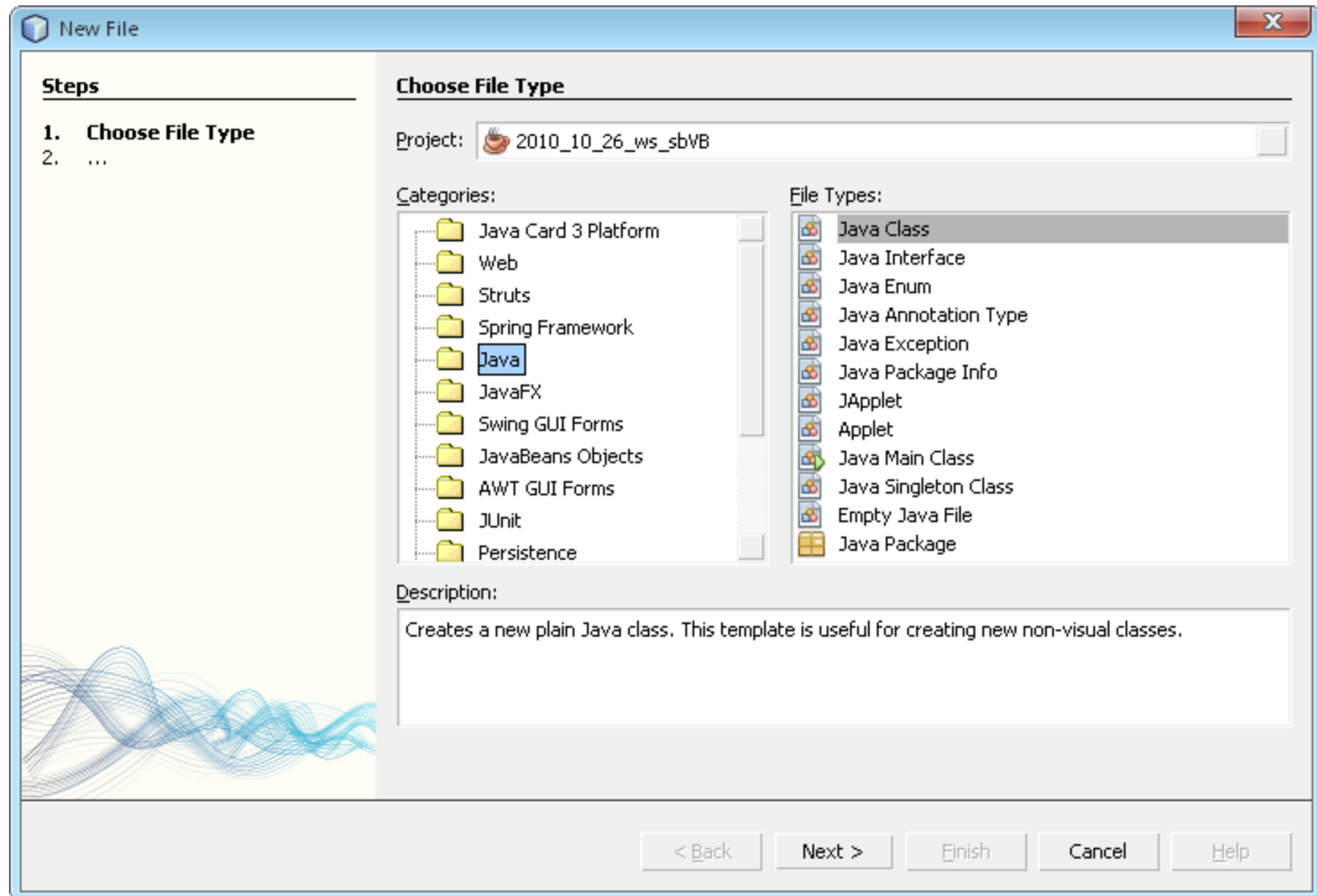
# New project for Web services in NetBeans





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# Create some java class





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# WS\_Hello class

New Java Class

**Steps**

1. Choose File Type
2. **Name and Location**

**Name and Location**

Class Name:

Project:

Location:  ☐

Package:  ☐

Created File:

< Back   Next >   Finish   Cancel   Help



# Code of HelloClass

```
package br.com.sbVB;  
  
public class HelloClass {  
    public String plus_a(String in) {  
        return in + "a";  
    }  
}
```





# Add axis2 plugin to netbeans 7.x

- In Netbeans menu:
  - Tools->Plugins ->- the "Settings" tab
  - Add
    - name = Dynamic Development UC update center
    - url = <http://deadlock.netbeans.org/hudson/job/nbms-and-javadoc/lastStableBuild/artifact/nbbuild/nbms/updates.xml.gz>
- Now you can go to the “Available Plugins” tab and the “Reload Catalog” button
- Now, you'll find the “Axis2 Support” plugin in the list, and can install it.
- Restart Netbeans
- Configure target location for Axis2.aar files
  - <tomcat>/webapps/axis2/WEB-INF/services



# Configure folder of tomcat in Netbeans plugin axis2

Menu: tools->options

The image shows the 'Options' dialog box in NetBeans, specifically the 'Axis2' tab. The dialog has a title bar with standard window controls. Below the title bar is a toolbar with icons for General, Editor, Fonts & Colors, Keymap, Java, PHP, C/C++, Miscellaneous, and Axis2. The 'Axis2' tab is selected. The main content area is titled 'Deployment' and contains the following settings:

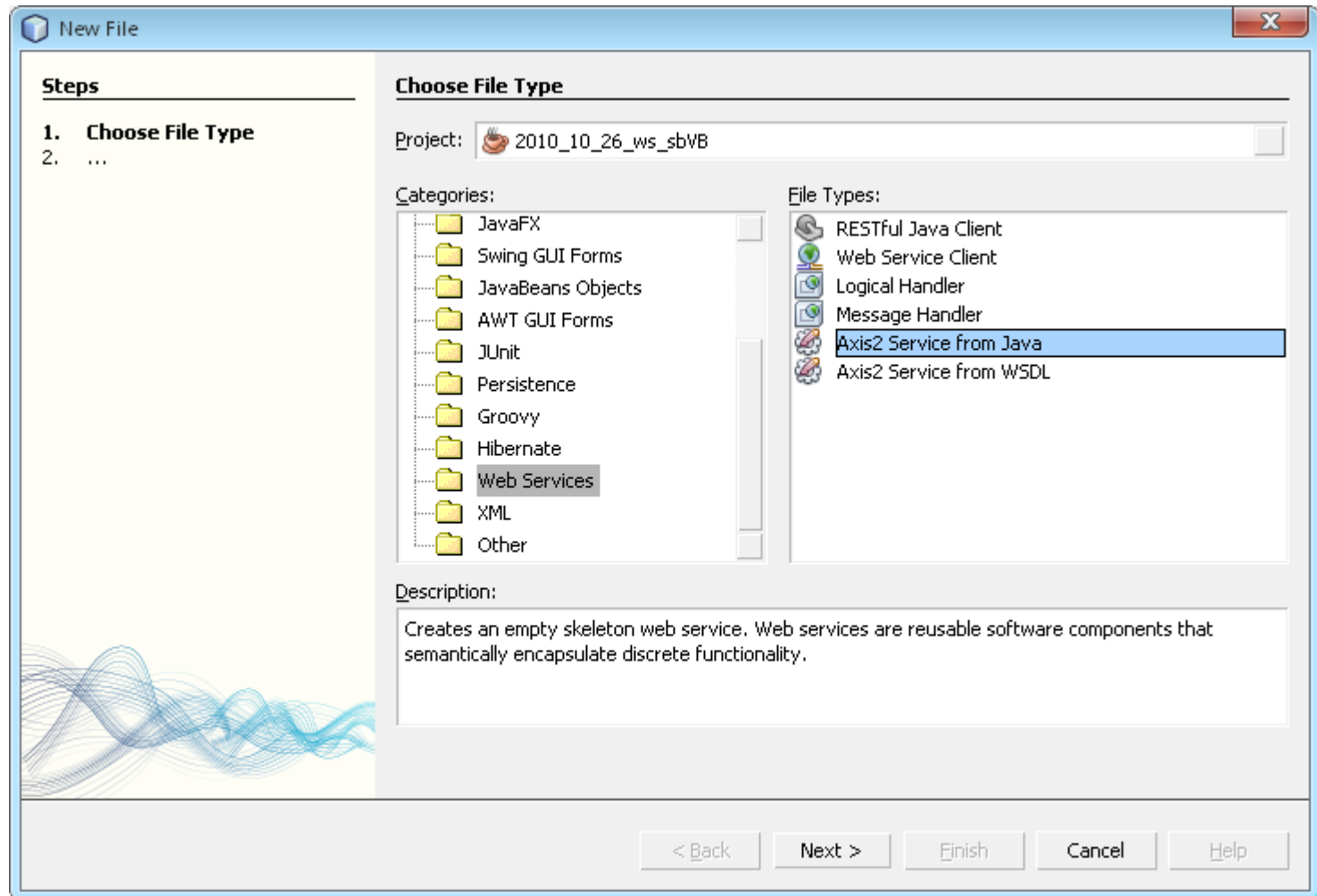
- Target Location for Axis2 .aar Files:** A text field containing the path `/home/sbvb/app/apache-tomcat-7.0.32/webapps/axis2` and a 'Browse ...' button.
- Specify the location of deployed axis2.war file or the location of unpacked axis2.war directory.**
- Axis2 runtime can be downloaded from:** <http://ws.apache.org/axis2>.
- To get axis2.war file go to AXIS2\_HOME/webapp directory and run build.xml ant script. Then copy axis2.war file to a servlet container, e.g. Tomcat.**
- Axis2 URL:** A text field containing `http://localhost:8080/axis2`.
- Use Tomcat Manager for Deployment:** A checked checkbox.
- Username:** A text field containing `sbvb`.
- Password:** A text field containing masked characters (asterisks).

At the bottom of the dialog are buttons for 'Export', 'Import', 'OK', 'Cancel', and 'Help'.



# Using Netbeans with axis2plugin, add Web Services to project

Menu: File->New File





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# Don't mark that check box !

New File

**Steps**

1. Choose File Type
2. **Service Type Selection**
3. Name and Location

**Service Type Selection**

☐ Create Empty Web Service

☒ Create Web Service from Existing Java Class

Java Class Name:

☐ Generate WSDL from Java Source Code  
(useful when you want to customize the default WSDL file generated by AXIS)

< Back   Next >   Finish   Cancel   Help



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# Right-click and deploy

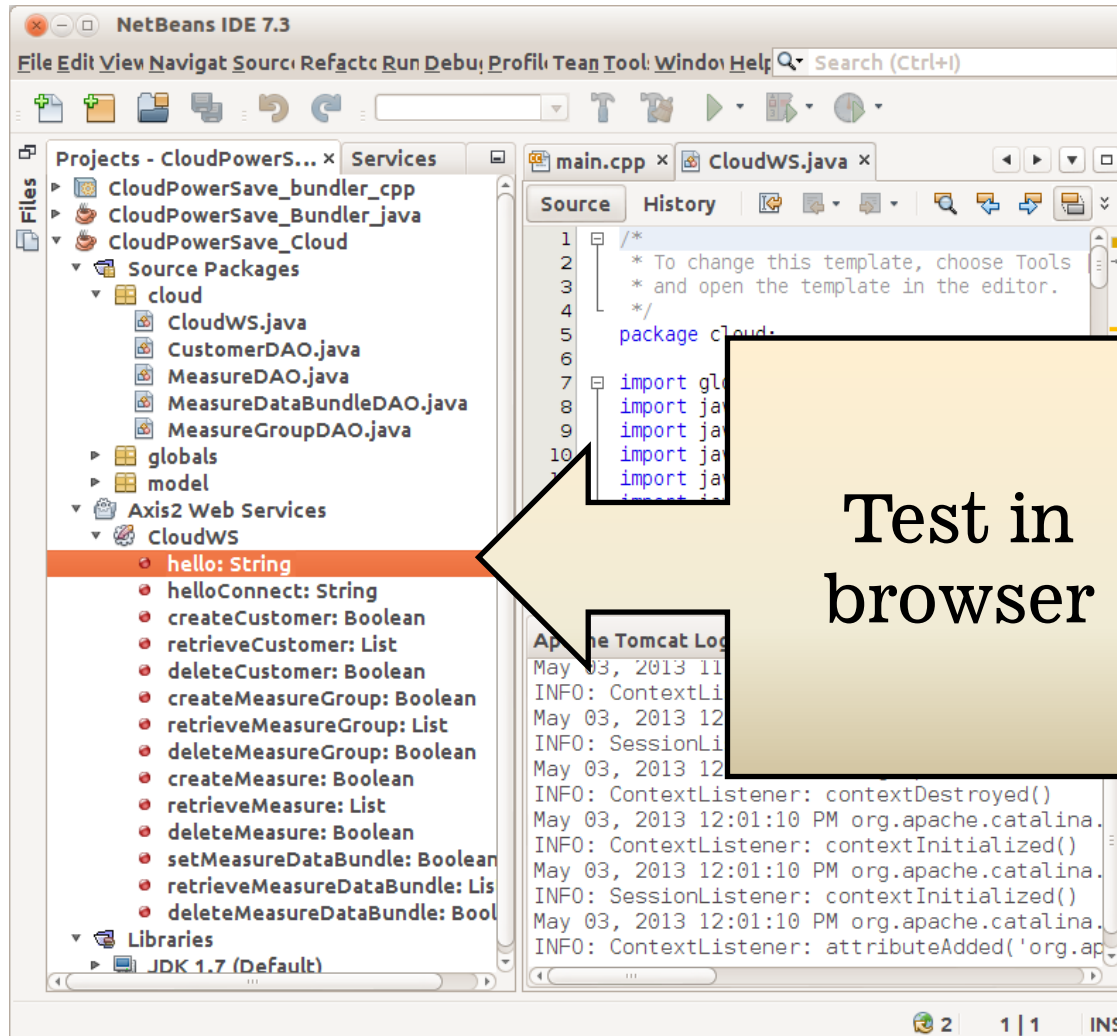
The screenshot shows the NetBeans IDE 6.9.1 interface. On the left, the 'Services' tab is active, displaying a tree view of web services. The '2010\_10\_26\_ws\_sbVB' project is expanded, showing 'Source Packages' (br.com.sbVB) and 'Test Packages' (WS\_Hello). A right-click context menu is open over the 'WS\_Hello' service, with the 'Deploy to Server' option highlighted by a red circle. The main editor window shows the Java code for 'WS\_Hello.java':

```
1 package br.com.sbVB;  
2  
3 public class WS_Hello {  
4     public String plus_a(String in) {  
5         return in + "a";  
6     }  
7 }  
8
```

The bottom of the IDE shows the 'Output' window with tabs for 'Tomcat 6.0', 'Tomcat 6.0 Log', and '2010\_10\_26\_ws\_sbVB (axis2-deploy)'. The output text indicates a directory was created: 'Created dir: C:\Documents and Settings\sVB\My Documents\NetBeansProjects\2010\_10\_26\_ws\_sbVB'.



# Test in browser





# Accessing the web services from the web browser

- <http://localhost:8080/axis2/services/Version/getVersion>

```
<ns:getVersionResponse  
xmlns:ns="http://axisversion.sample">  
<ns:return>Hi - the Axis2 version is  
1.6.2</ns:return>  
</ns:getVersionResponse>
```



- [http://localhost:8080/axis2/services/HelloClass/plus\\_a?in=banan](http://localhost:8080/axis2/services/HelloClass/plus_a?in=banan)

```
<ns:plus_aResponse xmlns:ns="http://sbVB.com.br">  
<ns:return>banana</ns:return>  
</ns:plus_aResponse>
```





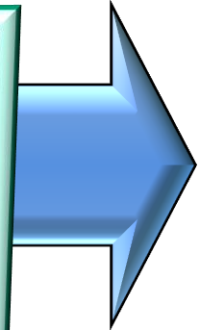
# Folder of services

- /home/sbvb/app/apache-tomcat-7.0.32/webapps/axis2/WEB-INF/services
- // add custom jars to folder below
- /home/sbvb/app/apache-tomcat-7.0.32/webapps/axis2/WEB-INF/lib



# Amazon cloud

aws  
Amazon  
Web-Services





# Basics

- EC2 (Elastic Computing Cloud)
- AMI (Amazon Machine Image)
- EBS (Elastic Block Storage)
- EBS-backed AMI × store-backed instance



# Some web pages

- Home page of service
  - <http://aws.amazon.com/>
- Console to control
  - <https://console.aws.amazon.com/ec2/>
- Resource center
  - <http://aws.amazon.com/developertools/>
- Resource center
  - <http://aws.amazon.com/developertools/>