1 Back-end
   - Programming Languages
   - Application Servers

2 Web Applications
   - Structure
   - Deployment Descriptor

3 J2EE
   - HttpServlet
   - Filter
Common Gateway Interface

- CGI Program / Script
- PHP, C
- Generate HTML

- Started by the Web Server
- Create process for each HTTP Request
- Costly
Script Languages

PHP
- Most popular
  - Local companies use it.
- Frameworks
  - Yii
- Content Management Systems
  - Joomla
  - WordPress
- Easy-to-start
- Supported by web server hosting companies
- Wikipedia

Python
- High-level, general purpose language
- Popular but not in Miskolc
- Easy-to-Learn
- Google, Youtube

Ruby
- Ruby on Rails Framework
- Not popular in Miskolc
- Twitter
Object Oriented Languages

- Web Applications
  - Complex,
  - Reliable,
  - Stable
- Expensive Infrastructure
- Components can be separated easily
- Good, well-tested code (hopefully 😊)

Development
- Slow
- Standardized
  - Fixed roles
  - Methodologies
- Difficult
  - If you do it well 😊
  - Lots of technology
- Both Java and C# are used by local companies
Overview

- Application
- Middleware
- Software Framework
- Environment for Dynamic Web Applications
- Contains
  - Servlet Container
  - JSP
  - Enterprise JavaBeans
- Servers
  - GlassFish, WildFly, Geronimo
  - WebSphere, WebLogic, JBoss
Common Tasks

- Admin Console
- Deployment
- Scaling
  - Manage Nodes
  - Clustering
- Monitoring
  - Server
  - Applications
  - Resources
- Resource Management
  - JDBC
  - JNDI
  - JMS
Installation

- Java Application
- Platforms
  - Unix
  - Linux
  - Windows
- No install.exe
- Extract and run
- Script files
  - bin/startup.sh
  - bin/shutdown.sh

Hints for Developers

- You are not a System Administrator.
- You should not operate an Application Server.
- Logging is essential.
- Log files grow quickly.
- Never run as root!
Usage as a Developer

- Local Deployment
- Manual Testing
- Demonstration
≈ Test Server

IDE Integration
- Eclipse
- IntelliJ IDEA
- NetBeans
Tomcat

- Apache Software Foundation
- Lightweight
- Servlet Container
- Versions
  - 8.0
    - Servlet 3.1
    - JSP 2.3
  - 8.5
    - HTTP/2
    - OpenSSL
- Popular among developers!
Tomcat

Directories

- bin
  - Script files
    - startup.sh
    - shutdown.sh
  - conf
    - XML
      - server.xml
      - tomcat-users.xml
    - LICENSE
  - logs
    - NOTICE
  - RELEASE-NOTES
  - RUNNING.txt
  - temp
  - webapps
    - 

- work
Tomcat for Developers

- IDE
  - IntelliJ IDEA
  - Eclipse
- Multiple Servers
- Local Configuration
  - Workspace
- Start/Stop Server
- Deployment
- Refresh / Restart

Tasks
- Run Locally
- Test Manually

See also
- Database Management
- Software Testing
- Operation Systems
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Web Applications

Structure

Web App
- Expected Directory Structure
- Standard Locations
- Deployed from Web ARchive

Root Directory
- Static Content
- Direct Access

```
+- images
  +- index.jsp
  +- META-INF
    |  \-- context.xml
  +- WEB-INF
    |  +- jsp
    |     +- 401.jsp
    |     +- 403.jsp
    |     +- 404.jsp
    |     \-- sessions.jsp
    |  \-- web.xml
```
Web ARchive

- ZIP File
- *.war Extension
- Contains Web Application
- Creation
  - `jar cvf ...`
  - Maven Packaging
- Can be Deployed
WEB-INF

Cannot be Accessed Directly!

**classes**
- 
- 
- 

**lib**
- 
- 

*Cannot be Accessed Directly!*

Zsolt Tóth (University of Miskolc)
Deployment Descriptor

WEB-INF/web.xml

- Details of Web Application
- Name
- Description
- Servlet Definition
- URL Mapping
- Listeners
- Filters
- ...

```
<web-app xmlns="...">
  <servlet>
    <servlet-name>greetings</servlet-name>
    <servlet-class>org.dummy.Greetings</servlet-class>
  </servlet>
  <servlet-mapping>
    <servlet-name>greetings</servlet-name>
    <url-pattern>/</url-pattern>
  </servlet-mapping>
</web-app>
```
Servlet Mapping

- **servlet tag**
- **Identified by** name
- **servlet-class**
- **Instance**
- **init-param**
  - Initialization
- **load**

- **servlet-mapping**
- **Key Value pair**
- **Extends application’s URL**
- *** wild card**

http://host:port/WebAppName/path
Filters

**filter**
- **filter-name** *Identifier*
- **filter-class**
- Similar to Servlet
- Preprocessing
- Forwarding / Rejection

**filter-mapping**
- **filter-name**
- **Selection**
  - *url-pattern*
  - *servlet-name*
Context-Param

- Context Initialization
- Key-Value Paris
- Available in Java
- Predefined Keys
  - contextConfigLocation

```xml
<context-param>
  <param-name>
    contextConfigLocation
  </param-name>
  <param-value>
    /dispatcher-servlet.xml
    /applicationContext.xml
  </param-value>
</context-param>
```
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Servlet

- `javax.servlet` Interface
- Generic Methods
  - `init`
  - `service`
  - `destroy`
HttpServlet

- javax.servlet.http
- Implements Servlet
- Run in Servlet Container
- Methods
  - doGet
  - doPost
  - doPut
  - doDelete

```java
doGet(
  HttpServletRequest req,
  HttpServletResponse resp){
  //do something
}
```
HttpServletRequest

- Request Information
  - getCookies
  - getSession
  - getHeaders
  - getParameter
  - getQueryString
HttpServletResponse

- Servlet Response
- HTTP Header
- Cookies
- add*
- sendError
- getWriter
- getOutputStream
Preprocessing Methods
- init
- doFilter
- destroy

Types
- Authentication Filters
- Logging and Auditing Filters
- Image conversion Filters
- Data compression Filters
- Encryption Filters
- Tokenizing Filters
- Filters that trigger resource access events
- XSL/T filters
- Mime-type chain Filter