# Exercise 5 (1)

**Scope: Multi-tier architectures**

**5.1** Explain the layers of a three-tier architecture and relate them. For each layer, explain in your own words the main functionality it provides (no, don't write: "presentation layer: provides presentation"; some more words are needed :-)

**5.2** Explain shortly how the presentation layer in web-based information systems is distributed between client and server.

**5.3** Explain the difference between a two-tier architecture and a three-tier architecture.

**5.4** What kind of architecture would result from minimizing or removing completely the business logic layer from a three-tier architecture? Explain.

**b)** Can you find a (popular) two-tier solution for web-based systems that incorporates this architecture?

# Exercise 5 (2)

**Scope: Online business appearance**

**5.5** Add HTML meta tags on your home page describing your business to search engines.

Optional: Provide a top frame where you can place banner ads. Fill the banner frame with banner ads (for simplicity: use banner ads saved from other web appearances).

For help on HTML, have a look at http://www.htmlhelp.com/reference/html40/ (in English) or http://www.sts.tu-harburg.de/intranet/WebDesign/SelfHTML7/ (in German).

**Scope: Realization of the business solution in a Java-based three-tier architecture**

**5.6 Set up and configure the sample Java-based server system** (provided on the ECommerce web page). Include the *GetPostServlet* in your system so you can test it (documentation on this can be found on the ECommerce page).

## Exercise 5 (3)

**The presentation layer**

**5.7 Servlets:** Understand how the *GetPostServlet* and the Servlet Environment work together and how they handle requests. For this, draw a UML activity diagram explaining how HTTP GET and POST requests are sent to the server, processed by the Servlet and how the HTTP responses are generated.

**5.8 Serve static pages:** Replace the *GetPostServlet* by the *ContentServlet* that serves files. Extend the Servlet so that it provides access to your online business homepage and the about page (with all included images).

**5.9 Add dynamic content:** Decide on what dynamic content you want to add and where you want to add dynamic content on your pages (to start with, you could add the current time and the overall number of users).

Read the provided documentation on the Apache Velocity Template engine. Add placeholders to your HTML pages, making them *templates*. Change the *ContentServlet* so that it uses the Velocity template engine and provided the dynamic content.

## Exercise 5 (4)

**The business logic layer**

**5.10** Refine (detail) the class diagram you have created in exercise 4. Note that this exercise is on a *design* level (not implementation yet).

**User modeling**

**a)** Add a class *User*. A user shall be identified by a *login name* and has a *password*. Add the corresponding attributes.

**Business objects**

**b)** For each attribute, add a getter and setter method (see documentation)

**c)** For each business object class, add a primary key attribute called *id* (of type String).

**Containers for life-cycle management and search functionality**

**d)** Add container classes for *Product* and *User*. The container classes should be called *ProductContainer* and *UserContainer,* or *Products* and *Users*.

**e)** Add *life-cycle management functionality* to the containers.

**f)** Add *search functionality* to the containers.

Find information related to the tasks 5.5 – 5.9 on the ECommerce page.