

# **The Group Project – Phases II to V**

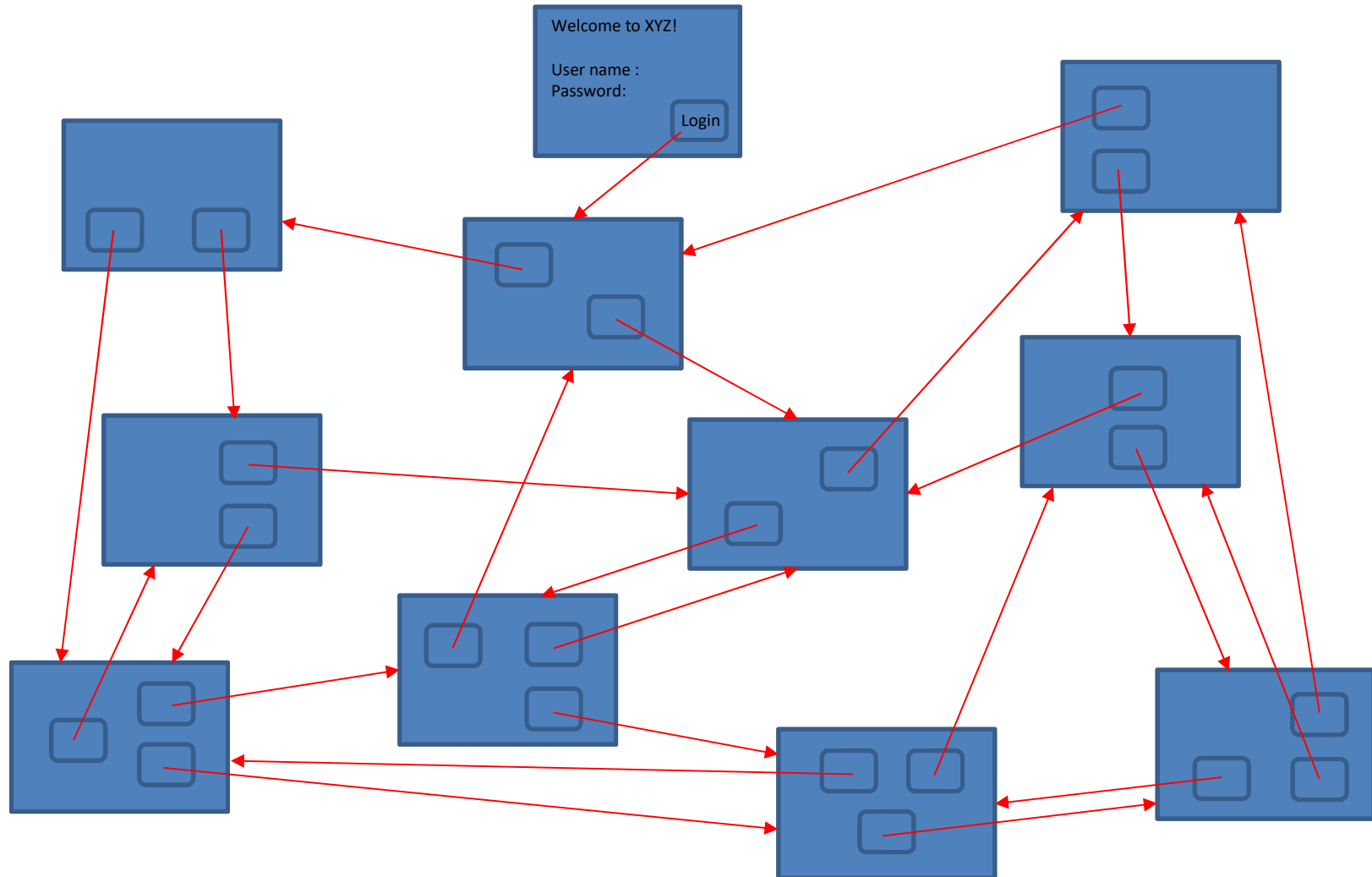
## Status Quo of the Project

- ❑ As a result of Project Phase I, at this point, each group should have
  - ❖ found an application that is worthwhile to be supported by a database
  - ❖ identified the main functions that the web-based user interface should provide
  - ❖ found real world data that support the functions identified before
  - ❖ explored colloquial queries that are important for the application selected
  - ❖ identified the different user groups involved in the application with different roles, such as normal users, managers, and administrators
  - ❖ determined which public domain and/or proprietary software is deployed to perform the task (Note: the database system used must be CISE Oracle)
  - ❖ organized the distribution of work in the group (at least two group members per task)

## Project Phase II: E-R Diagram Design and UI Design (I)

- ❑ Overall goal: Description of the overall conceptual design of and solution approach to the group's selected application
- ❑ Two aspects
  - ❖ User interface design
  - ❖ Conceptual database design
- ❑ User interface design
  - ❖ Devise the set of web pages that is needed to convey the promised functionality of the application to the user at the user interface
  - ❖ Clear description of the flows of action and web pages the user can expect
  - ❖ Start: Entry or welcome web page followed by a number of successive web pages that are appropriately linked with each other.
  - ❖ The whole web site can be regarded as a graph where the *nodes* are the *web pages* and the *edges* are the *URLs* connecting the web pages.

## Project Phase II: E-R Diagram Design and UI Design (II)



## Project Phase II: E-R Diagram Design and UI Design (III)

### ❑ User interface design (*continued*)

- ❖ Figure does not indicate user actions that are activated and performed on the same web page.
- ❖ Example: Query sales data from a database obtained by a user function in a window and shown as a graph presentation in the same window
- ❖ Goal of UI design: Web pages, components, control flow, and user functions should be conceptually understood and mature so that the *application logic* is clear and the implementation of the user interface can be performed in a next step
- ❖ Comments on the application logic
  - An application logic must exist
  - A web page that shows a list of buttons that trigger a number of user functions is insufficient
  - The application logic should **not** be complex, that is, no sophisticated main memory algorithms should be developed, the **emphasis should be on the embedded SQL queries**

## Project Phase II: E-R Diagram Design and UI Design (IV)

- ❑ Conceptual database design
  - ❖ Apply the Entity-Relationship (E-R) Model that we have learned in class
  - ❖ Identify the important entity sets, relationship sets (including cardinalities), and attributes, which are relevant and have later to be stored in the database
  - ❖ Draw the E-R diagram that contains the elements identified above
  - ❖ In addition, provide a clear motivation for the design and explain the important concepts of the E-R diagram in sufficient detail
- ❑ The *second project deliverable* should contain a clearly designed and motivated user interface design and conceptual database design
- ❑ Any suitable tool (software, by hand) can be used for drawing the E-R diagram, no programming of web pages required
- ❑ Only the first submission of a group's second deliverable will be graded
- ❑ If the first submission is so dissatisfactory that the group cannot move on with the next phase, a revision will be requested from the group that will not be considered for (re)grading

## Project Phase III: Database Schema Construction (I)

- ❑ Apply the transformation algorithm presented in class to the group's E-R diagram and obtain relational database schema
- ❑ First step: Relation schemas are presented in the form  $R(A_1 : D_1, \dots, A_n : D_n)$ ,  $R$  is a table name, the  $A_i$ 's are attribute names, and the  $D_i$ 's are domains or data types
- ❑ Second step: Relation schemas are transferred to SQL table schemas by using the *create table* command, table schemas should be enhanced by all needed and desired integrity constraints so that they can be directly used in Oracle
- ❑ The *third project deliverable* should comprise the SQL database schema with additional explanations (if needed)
- ❑ Original screen snapshots from the Oracle DBMS are required that show all *create table* commands and the created empty tables
- ❑ Each group should add their (perhaps modified) ER diagram at the beginning of the document that is the input of the transformation algorithm

## Project Phase III: Database Schema Construction (II)

- ❑ An important step of database design, called **normalization**, is missing
- ❑ Purpose of normalization
  - ❖ Elimination of possible redundancies, inconsistencies, and anomalies of the database schema
  - ❖ Improving the quality of a database schema
- ❑ We skip the normalization process at this point since
  - ❖ the normalization process requires a deep understanding of **relational database design theory**
  - ❖ this theory will not have been taught when the third deliverable has to be submitted
- ❑ Groups that are willing to rearrange their database schema at a later time may perform the normalization process
- ❑ However, this will require a new upload of all data according to the modified database schema



## Project Phase III: Database Schema Construction (III)

- ❑ Only the first submission of a group's third deliverable will be graded
- ❑ If the first submission is so dissatisfactory that the group cannot move on with the next phase, a revision will be requested from the group that will not be considered for (re)grading
- ❑ Note: It is *not* the task of this phase to fill the database schema with data

## Project Phase IV: Project Software Implementation (I)

- ❑ Expected status quo of each group
  - ❖ Rather clear picture how the application software will look like, without having performed any implementation yet
  - ❖ Clarity about the tools and programming languages that will be deployed in the project
- ❑ The more a group invests into the overall design, the easier the implementation will be
- ❑ Main tasks of the implementation
  - ❖ Implementation of the user interface
  - ❖ Pre-processing and cleaning of the real-world data for the application
  - ❖ Upload of the pre-processed real-world data into the database
  - ❖ Establishing the connection between Oracle and the application program
  - ❖ Formulating the SQL queries and embedding them into the application code

## Project Phase IV: Project Software Implementation (II)

- ❑ Establishing the connection between the database and the user interface
  - ❖ Important since it enables the group to send data from the user interface to the database and retrieve data from the database to the user interface
  - ❖ Advice: Create simple test user interface
    - It could contain a single welcome screen and ask for a username and a password
    - Send both data items from the user interface to the database and store them in a correspondingly structured table
    - In the user interface initiate their lookup in the database and check whether the username/password combination exists
    - Send a corresponding result back to the user interface that displays either the message “Username/password is valid!” or “Username/password is not valid!”
    - Afterwards, develop your application on both sides of the connection

## Project Phase IV: Project Software Implementation (III)

- ❑ Two *checkpoints* check the progress of each group
- ❑ Checkpoints are mandatory for all groups
- ❑ Ungraded service
- ❑ Purpose: Avoid that groups start too late with the implementation in the semester and then get overwhelmed by the implementation task due to its complexity and required time involvement
- ❑ The instructor will informally meet online with each group and have a relaxed conversation about the group's project implementation
- ❑ Duration of such a meeting is 15 minutes
- ❑ **All** group members have to be present

## Project Phase IV: Project Software Implementation (IV)

- ❑ Checkpoint 1 especially checks whether each group has had a successful and promising start
- ❑ Special questions
  - ❖ Has the group managed to establish the connection between the user interface and the database for the technologies chosen by the group?
  - ❖ Has the group been able to find real world data sources that fit to and can be used for the group's project? If not, have "meaningful" data been generated (This requires the instructor's explicit permission)?
  - ❖ Have these data already been pre-processed so that they can be bulk loaded into the database?
  - ❖ Has the database schema been created in Oracle?
  - ❖ Have the pre-processed data been bulk loaded into the database according to the database schema?
  - ❖ Has the minimum of 100,000 tuples been stored in the database?
  - ❖ Have parts of the user interface been implemented?

## Project Phase IV: Project Software Implementation (V)

- ❑ Checkpoint 2 especially checks whether each group has made considerable progress since the first checkpoint and implemented the main parts of its project
- ❑ Special questions
  - ❖ To which extent has the database part been finalized?
  - ❖ To which extent have the data been loaded into the database?
  - ❖ To which extent has the user interface been implemented and is functional?
  - ❖ To which extent have the needed SQL queries been designed and embedded into the code of the user interface?
  - ❖ To which extent has the whole software system been tested?

## Project Phase V: Project Software Demonstration (I)

- ❑ At the demonstration day(s), which will be at the end of the semester, groups have to present their software system
- ❑ Groups have to arrange an appointment with the instructor
- ❑ The atmosphere during a project demonstration is usually very relaxed and informal
- ❑ Structure of the demonstration
  - ❖ Each project demo lasts 30 minutes
  - ❖ In the first 10 to 15 minutes each group will provide a presentation of their software system
  - ❖ In the next 10 to 15 minutes the instructor will ask questions about the software system
  - ❖ In the last 5 minutes, the instructor will determine the groups' project demo grade

## Project Phase V: Project Software Demonstration (II)

- ❑ Group presentation in the first 10 to 15 minutes
  - ❖ Held by one or several group members
  - ❖ Provides and explains the *highlights* of the group's project functionality and implementation
- ❑ The following aspects do *not* belong to the highlights:
  - ❖ Input masks and input procedures
  - ❖ Correctness tests for input data
  - ❖ Simple search procedures for data. Especially searching can be performed by very simple SQL queries and is therefore not so much of interest.
- ❑ The following aspects belong to the highlights:
  - ❖ Interesting functionality at the user interface that allows the user to analyze the data and leads to new conclusions of and insight into the data stored in the database (for example, trends)
  - ❖ Complex analytical procedures for data that lead to interesting conclusions of and insight into the data stored in the database



## Project Phase V: Project Software Demonstration (III)

- ❑ Question-and-answer period in the next 10 to 15 minutes
  - ❖ Instructor will ask questions to all aspects of the group's software with respect to both its functionality and its implementation
  - ❖ A group has to answer these questions immediately
  - ❖ Typical question: “Show me and explain the SQL query that does ...”
- ❑ Evaluation and grading in the last 5 minutes
  - ❖ Evaluation of the quality of the project software, the presentation, and the answers
  - ❖ Determination of the project demo grade based on these three aspects
- ❑ Slide presentations are *not* allowed during the group's presentation
- ❑ A documentation of the software is *not* required