

Learning Outcome

The Field Work on *Analyzing Database Systems* is a venue for students to achieve the learning outcomes below:

- LO1. Articulate the importance of database systems in our society;
- LO2. Analyze the data and information that can be derived from a given database to support organizational decision-making activities;
- LO3. Design a preliminary database schema to store the data requirements of the organization;
- LO4. Formulate SQL statements to access data and generate information from the given schema;
- LO5. Present the organization's data and information requirements, and defend design choices.

Students will investigate the uses of database systems in our society, and how databases play an important role for managing the data and information needs of their stakeholders. They will determine the data and information needs of the organizations managing these systems, make preliminary design of a database schema to represent the data, and describe how data is captured, stored and manipulated or processed to generate relevant and appropriate information that are utilized to support the daily activities, operations, and purpose of the various users in the organization. The field work report will then be used as the draft software requirements specification for MCO2 on *Developing a Small-Scale Database Solution*.

Types of Applications

Students are to form teams with **3 - 4 members**. Each team will be assigned to review a specific **online retail application**. Examples of such systems include:

- Online retail stores provided by OLX, Lazada and Zalora
- Online reservation systems for booking air ticket (e.g., PAL), train ticket (e.g., trenitalia.com and Shinkansen), bus transit (e.g. WTS Travel and Terravision), hotel accommodation (e.g., Agoda, AirBNB, booking.com), movie tickets (e.g., SureSeats, TicketNet), and car transport (e.g., Uber, Grab)

The specific application will be assigned by the INTRODB teachers. There will be no duplicate assignment of application to be reviewed across two sections.

Methodology and Milestones

The development of the Field Work Report must proceed as follows. Note that ***Groups who arrive late for submission of documents and presentation will be penalized accordingly.***

Step 1. Conduct Background Research

Students conduct library and/or Internet research to build the requisite background knowledge on -

- a. The various components of a database system;
- b. The business organization that provide the online application being reviewed;

- c. The purpose of the online application, i.e., *What is the database system for? What are its intended usage or purpose?* It is also important to understand the relevance and usefulness of the system to the end users and the organization.

Submit a one-page Overview of the Online Application assigned to your group on **October 2**, first 10 minutes of class. Be prepared for recitation to present your initial finding.

Step 2. Plan for Data Gathering (Requirements Collection)

Students conduct requirements collection to gain sufficient understanding of the assigned database system. Each group is required to conduct an *online software evaluation*, and at least one (1) other data gathering method - *end users interview*, *survey* or *observation*. A brief description of each of these techniques is presented in Appendix A.

Prior to conducting these data gathering activities, each team must prepare a one-page Data Gathering plan (see Appendix B for the content). This will be submitted also on **October 2**, first 10 minutes of class. Be prepared for recitation to discuss your data gathering plan.

Step 3. Execute the Data Gathering Plan

Students conduct each of the data gathering techniques using the data gathering plan derived from the previous step as guide to determine the following:

- a. What data are captured and stored?
- b. What data entry forms are used to capture the data?
- c. What types of information and reports are generated by the system?
- d. How are user views designed to present the information and reports to the users?

Submit a report containing the following:

- A diagram showing the business process vis-a-vis the data and information requirements. Follow the notation: (a) rectangles represent process, (b) arrows represent flow, and (c) sheets/papers/cylinders represent data files.
- A bulleted summary list of major features and corresponding data and information.

This report should not exceed two (2) pages and must be submitted on **October 9**, first 10 minutes of class. Be prepared for an informal presentation of your business process.

Step 4. Prepare the Final Report

Using all the materials from Steps 1 - 3, write your Field Work Report, as outlined in the next section.

Final Deliverables

The Field Work has two components – a type-written report and a class presentation.

- A. Prepare a type-written report, **minimum of three pages** (excluding the title page), single-spaced, short-bond paper, containing the following:

1. *Introduction*

In paragraph form, provide an overview of the database system that you reviewed as well as its rational/purpose. Focus on the database system and the business process that it supports, not the company. This section should end with a scenario for the reader to understand where and how the system you have investigated is being used.

The following serves as your checklist in writing this section. The answers to these questions must be sourced from the software evaluation and end user interviews.

- What is your assigned database system? Include the URL.
- What is the database system for? What are its intended usage or purpose?
- Who are the different users of the system? What tasks can they perform on the system?

2. Data Requirements of the < XYZ System >

In this section, describe the important features of the online database system. The focus should be on the data that is captured, stored and manipulated to support the different types of users in performing their tasks (business process) by providing access to relevant data. A draft design of the database schema used to store and retrieve the required data is also presented.

2.1 Software Features

In paragraph form, discuss the features of the software that supports the business process, such as *create an account*, *update details* (work experience, educational background), *add a new friend*, *make/receive recommendations*, among others. Relevant screenshots should be provided to support your discussion. Captions (e.g., *Figure 1 Registration Form*) must be provided for the screenshots.

An example content is as follows:

A staff schedules meetings among team members using the *New Calendar Event* form (shown in Figure 4). The staff specifies the following details for each scheduled meeting: the date of the meeting, the start and end times, the venue, and a brief description or agenda. The staff then invites participants to the meeting by selecting names from a list.

If there is a new team member, a user account must be created first. The *Register New User* form (Figure 5) is used to provide the details of the new team member, which includes the name, email address, and ...

A staff can modify the details of a previously scheduled meeting by selecting an event from the *View Calendar Events* (Figure 6). Users can change the mode of viewing the events - day view (Figure 7), week view (Figure 8), or month view (Figure 6). <You can further explain briefly each of these three features, highlighting the data/information that is accessed (created, updated, retrieved/displayed). Use screen shots as necessary to support your discussions.>

2.2 Database Design (Minimum of 5 Major Tables)

Based on your evaluation of the software features and business process, and analysis of the data and information requirements, present a possible database design in tabular form. Populate the database with at least five (5) sample records. For example:

User Accounts

The *User Accounts* table (shown in Table 1) is used to store the data of each registered user in the Online Calendar application. It has the following fields:

- username - <describe this field>
- email address - <describe this field>
- password - <describe this field and any data type constraints, e.g., minimum of 6 characters>
- dateregistered - <describe this field>
- lastlogin - <describe this field>

Table 1. User Account table.

<u>Username</u>	EmailAddress	Password	DateRegistered	LastLogin
juandelacruz	jdlc@yahoo.com	*****	2013-05-12	2013-09-22
johnsmith01	john.smith@gmail.com	*****	2010-07-18	2013-09-20
polly-yanna	polly-yanna@gmail.com	***** **	2011-11-22	2012-10-09
cobbrian	brian.cob@dlsu.ph	*****	2012-01-29	2013-09-22
mayreyes	marilyn.reyes@smart.com	***** **	2012-10-07	2013-09-21

Include the following in your discussion:

- Attribute constraints, such as unique values and domain values
- Specify relationships between table, e.g., *Each user in the User Account table has a corresponding list of one or more items in the Item Inventory table.*

3. *Information Needs of the < XYZ System >*

Stored data can be used to generate both transactional and analytical reports that support not only the business daily operations, but also major decision-making activities.

Given this, database systems can be broadly classified into two types - transactional (OLTP) and analytical (OLAP). OLTP or online transaction processing is characterized by a large volume of short transaction operations on the database, i.e., INSERT, UPDATE, and DELETE. The focus is on supporting fast query processing using basic SELECT statements while maintaining data integrity within a multi-user, multi-access environment. The queries usually contain detailed and current data, e.g., *list of courses offered for <given term and AY>, list of students enrolled in INTRODB <section> for <given term and AY>, CGPA of <all/specific set> students.* Software features in 2.2 that create/update records and display lists of data fall under the OLTP category.

OLAP or online analytical processing, on the other hand, is characterized by a low volume of queries that are very complex and involve aggregations. Although the term OLAP has been around for more than a decade, it is currently gaining new popularity through its more modern

terms, i.e., data mining, data analytics, business intelligence, as the business environment become more competitive and heavily reliant on powerful computing technologies.

In this chapter, the focus of the discussion is on the reports that can be generated from the given database schema presented in Chapter 2. There are various types of reports that can be generated, such as a listing of the database contents, as well as summary reports for decision-making. Grading is determined based on the quality and variances of the reports that you plan to generate, which can be achieved by applying analytical and critical thinking skills in conceptualizing and designing your reports. A minimum of **five (5)** reports should be provided, four (4) of which are OLTP and the last one is an OLAP.

3.1 Transaction Reports

Describe at least four (4) reports to be generated that are classified under OLTP. This type of reports include those that are displayed by the application to allow user selection, e.g., *list of course offerings*, *list of products*, *available trips*, and *current content of the shopping cart*. Other examples are reports that may be needed by a specific group of users, e.g., *list of students enrolled in a course*.

For each report, the following must be discussed (in paragraph form):

- a. A brief description of the report;
- b. Its purpose and intended users, e.g., *Why is the report generated? How often is the report generated? Who needs the report and for what purpose?*
- c. The data needed to generate the report
- d. The data and information shown in the report
- e. The report format or layout:
 - If the report that is available online, provide sample screenshot.
 - If the report is designed by your team, provide your proposed format.
- f. The SQL statement to retrieve the contents of the report based on your database design in 2.2.
- g. Variants of the report by tweaking certain parameters, e.g., *list of students for <a given course>*

Your sample reports should include report headings (e.g., company name, report title, date generated) and summary data (e.g., totals, counts, sums, averages). Below is an example discussion:

The Online Calendar system generates various reports ...

List of User Accounts

This report is used to generate the list of all user accounts in the system. It is used by the system administrator to track user registration activities. The list is arranged chronologically based on the date of registration of the user, as shown in Figure 10.

MyCalendar			
List of Registered Users as of September 14, 2015			
<u>Date of Registration</u>	<u>Username</u>	<u>Email Address</u>	<u>Last Login</u>
2013 May 12 Sep 22	juandelacruz	jdlc@yahoo.com	2013
2012 Oct 07 Sep 21	mayreyes	marilyn.reyes@smart.com	2013
2012 Jan 29 Sep 22	cobbrian	brian.cob@dlsu.ph	2013
2011 Nov 22 Oct 09	polly-yanna	polly-yanna@gmail.com	2012
2010 Jul 18	johnsmith01	john.smith@gmail.com	2013 Sep 20
Total: 5 registered users			
4 active user(s)			
1 inactive user(s)			

Figure 10. List of Registered Users Report

Different variants of the list of user accounts can be generated, such as the list of user registrations for a given year or month, and the list of active user accounts (those accounts that have accessed the system within the last 30 days). Samples of these are shown in Figure n.

<Provide what the sample variant report would look like here.>

3.2 Analytical Reports

In this section, describe one (1) analytical report that can be generated. Examples include those that provide aggregate summary of purchases, e.g., product sales for different branches over a period, which can be used to find buying trends and statistics that can help in decision making and forecasting. An analytical report shows comparative values across two or more attributes or dimension, e.g., date vs location, product vs date, for example:

Total Volume of Product Sales for Branches in NCR for 2015

Product / Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
13" Laptop Sleeve	12	20	29	24	30	75	56	48	33	29	22	90	
Flash Drive 16GB	20	45	48	16	12	22	24	35	48	26	12	88	
Optical Mouse	8	6	4	1	1	60	48	35	22	18	15	75	

Wireless Keyboard	10	8	6	2	2	65	58	47	45	33	21	60	
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Conduct additional research work to find out the possible types of OLAP reports that can be generated. Follow the rest of the guidelines for 3.1 in terms of report format and discussion.

- Report title
- Description and purpose of the report
- Sample report layout and content
- Data sources needed to generate the report
- SQL query(ies) to generate the report

4. *References and Acknowledgement*

This section allows you to properly cite all materials that you used, be these in the form of books or online resources. You must also acknowledge any person(s) and/or organization(s) you have interviewed or gathered the information from.

5. *Appendix*

This section contains the interview transcript, user surveys and other instruments used for data gathering.

Notes:

- Always review the lecture slides and the main textbook/reference, to guide you in doing this Field Work.
- Conduct a thorough analysis of application that has been assigned to your group. Be resourceful and review two or more related systems to identify important features that are common across these systems.
- Remember that whatever you have learned from this activity will serve as resources for your INTRODB software project, so be extensive in doing your Field Work.
- Formatting requirements:
 - Include a Title Page.
 - Pages of the document must be numbered.
 - Check your document for spelling and grammar errors.
 - Proper usage of language and terms must be observed.

Submission Policy:

- Submit a printed copy of your Field Work report on **October 23** during the first 10 minutes of the class.
- Prepare a 15-minute Powerpoint presentation that highlight the business process and data requirements, as well as the generated reports.

- Email the following files to your INTRODB teacher with the subject heading **INTRODB Field Work** before the start of your INTRODB classes on or before the submission date.
 - Field Work report with filename **INTRODB_<section>_<lastnames of members>.doc(x)**
 - Database script file with the filename: **INTRODB_<section>_<lastnames of members>.sql**
 - Presentation file with **INTRODB_<section>_<lastnames of members>.ppt(x)**
- Late submissions will receive 10 points deduction per day and 0 points for the presentation. No late submissions will be accepted after October 27.
- **Plagiarized works will automatically be given a grade of 0.0 for the course.**

Criteria for Grading

You will be graded based on the following criteria:

Correctness of the DB Design, Reports and SQL	40%
Clarity, Relevance and Completeness of discussion	30%
Classroom presentation	30%
Deductions for non-compliance with document format (title page, chapters, page numbers, tables and figures, references, language, grammar)	

Format of the Title Page

<Title of your system>

A Field Work Report
for the course on
Introduction to Databases
(INTRODB)

Submitted by

<lastname, firstname> of Group Member 1
<lastname, firstname> of Group Member 2

<lastname, firstname> of Group Member 3
(in alphabetical order)

<Teacher's Name>
Teacher

<Date of Submission>

Appendix A. Techniques in Data Gathering

Students conduct data gathering to gain a sufficient understanding of the assigned database system. Data gathering focuses on three main aspects of the database system being reviewed, namely the data that is captured, stored, retrieved and manipulated, the business rules, and the business processes that operate on the data.

Four methods of data gathering can be conducted - *online software evaluation*, *stakeholders interview*, *end user survey*, and *site visitation and observation*. Each team is required to conduct an *online software evaluation* on their assigned database system, and a second method of their own choosing.

Software Evaluation

This data gathering technique will enable each member of the team to have a first-hand experience in evaluating and using the assigned database software. It is recommended that similar online systems should also be reviewed to identify the basic features of the specific category of database system, for example, *what are the common features of the online food ordering systems, or online ticket reservation systems, or group buying applications?*

During the software evaluation, each team member should focus on the following:

- Data that are captured, processed and retrieved
 - Data attributes and constraints (business rules)
- Types of reports (data and information) that are generated and displayed
 - Data included in the report
 - Report format and details
 - Frequency of report generation and for which classes of users
- The application interface through which users may access (entry, view) the data
- The availability of basic tasks – add, modify and remove data – for each class of users
 - Restrictions, i.e., *Are users restrained from accessing certain data?*
- Other tasks that users can perform in the software

The output of the software evaluation and subsequent team discussion can then be used to further expound on the software scope and prepare the team for both database design and application design activities (for the prototype database software project).

Stakeholders Interview

This data gathering technique will enable the team to direct questions to the stakeholders in order to broaden their understanding of the database system's role in the organization's day-to-day operations. Face-to-face interview as well as technology-based mechanisms (such as emails) can be utilized. With this method, the team can raise questions regarding the software, to clarify and resolve issues and assumptions, and to further explore the *business data, rules and processes*.

Prepare your questions prior to going to the interview. During the interview,

- Introduce yourselves (your name, degree and school), and the purpose of the interview.

- Provide an interview outline, i.e., what do you want to get out of this interview.
- If you will be recording the interview, respectfully ask for permission.
- Identify a member, called the “Note Taker”, to take down notes of the interview.
- Start with a basic question (remember: focus on the business data, processes and rules).
- Give the Interviewee the chance to speak while all team members listen intently.
- Allow each member to have the opportunity to ask his/her follow-on questions based on the response of the interviewee in order to gather more details and to clarify assumptions.
- When there are no more questions from the team, the Note Taker summarizes the important points from the Interview.
- Sincerely thank the Interviewee. Respectfully ask, if needed, for his/her email address and if you can use this to correspond to him/her in case you have further clarifications.
- Other guidelines for face-to-face interview:
 - Be patient with the interviewee.
 - Speak the interviewee's language.
 - Ask questions concerning the database software.

If your team is conducting a follow-up interview through email, observe the following guidelines:

- Compose your letters well. Do not send incomplete or unedited emails.
- Do not write long letters that will tire out the reader.
- Observe proper use of the language.
- Check your spelling and grammar.
- If the Interviewee does not respond within a couple of days, explore alternative elicitation methods or find alternative Interviewees.

Terminating condition: The number of interview questions and the length of the interview depend on how well you have phrased your primary and follow-up questions such that at the end of the interview, you have the answers that you need to do your report.

End User Surveys

This data gathering technique will enable the team to gather feedback from the end users of the database software. The focus of the survey is on the data that the software collects from the end users and the information that the end users gain from using the software. A survey form is usually administered, containing items or questions regarding an end user's experience in using the software (focusing on data and processes/tasks that the end user can perform in the software). The important concepts of views, data integrity and data consistency should be evident after this method has been performed.

During a survey:

- Introduce yourselves (your name, degree and school), and the purpose of the survey.
- Pre-survey: Go through the survey questionnaire with the end user to ensure he/she understands what you are looking for.
- Survey proper: Let the end user answer the questionnaire without your intervention to avoid introducing biases.
- Post-survey: Review the filled survey questionnaire. If necessary, ask the end user if it is alright to do a debriefing for you to clarify some of his/her answers. Do not take any photo or video recording to maintain end user confidentiality and privacy.

End User surveys can be conducted in parallel, i.e., one team member per end user. In some cases, an End User interview may be conducted instead.

Terminating condition: You need to survey at least 5 users. The number of survey items and follow-on interview depend on how well the results will help you write your report and support your findings from the other data gathering methods.

Site Visitation

This data gathering technique will enable the team to observe the database software in actual use by end users and stakeholders. Prior to a site visitation, the team can conduct an ocular inspection to visit the site and find a spot where the team members can discreetly observe the end users. Do not take any video or photo recording of the observation process unless you have secured the approval of the site manager and the end users.

During a site visitation, observe how the end users are actually using the database software:

- How long do they use the software?
- What are their typical tasks?
- Were they able to do the necessary tasks in the system?
- Were they able to access the data that they needed?
- Did they seem lost or confused?
- Did they encounter any problems in using the software?

Usually, it may be helpful to complement the observation process with an *End User Survey* to get immediate and first-hand feedback regarding the user's recent experience in using the database software.

Terminating condition: The length of time you need to observe a site depends on when you think you have enough materials to help you write your report and support your findings from the other data gathering methods.

Exit Criteria for Data Gathering

At the end of the data gathering activities, the team should have answers to ALL of the following questions:

- What are the reasons (rationale, motivation) for using a database in your chosen organization?
 - What is the purpose for the database system?
 - Who are the different classes of users that will need access to the database?
 - What data views can be defined for each of these users to restrict their access to the database?
- Can you distinguish the primary and the secondary users of your database?
 - Who are your primary users? What data do they need from the database?
 - Who are your secondary users? What data do they need from the database?
 - How will your primary and secondary users interact with one another?

- What classes of data does the business maintain?
 - Is the data static, or does it change often?
 - What business rules affect how the data is stored and accessed?
 - What business processes are involved for creating and processing the data?
 - What business processes need to retrieve the data? For what purpose?
 - What information needs to be derived from the data? For what purpose?
- Can you specify the Business Requirements?
 - What tasks (business processes) need to be performed in the database?
 - Who will perform these tasks?
 - What data are associated with each of these tasks?
 - How do the processes interact with one another?

The Data Gathering phase ends once your team can clearly define a complete process of data capture, storage, manipulation and retrieval from two or more classes of users. Otherwise, perform as many data gathering activities as needed to complete the requirements.

Appendix B. Content of the Data Gathering Plan

Prior to conducting the data gathering activities described in Appendix A, each team must first prepare the *Data Gathering Plan*, which contains one or more sub-plans to guide the team through the data requirements gathering phase using the relevant elicitation method.

Instructions

1. Review the different types of requirements data gathering techniques described in Appendix A.
2. List down the tasks that you need to perform to prepare for each type of data gathering. For example:

Data Gathering Technique: Online Software Evaluation

Things to prepare before conducting a Software Evaluation:

- Determine the web site of <system>
- :
- Find other similar systems
- :

Data Gathering Technique: Stakeholders Interview

Things to prepare before conducting an Interview:

- Find out about the business or organization
- Find out about the software
- Identify the different classes of stakeholders
- Schedule an Interview with each of the stakeholders
- :

Data Gathering Technique: End User Surveys

Things to prepare before conducting a User Survey:

- Find out about the business or organization
- Find out about the software
- Identify the different classes of users

- Prepare the survey questionnaire
- Print copies of the survey questionnaire
- :

3. State your data gathering questions. Focus on the important things you want to find out, specifically the the data requirements, the business rules, the business processes, and the different classes of users.

Data Gathering Technique: Stakeholders Interview

Questions:

- :
-

Data Gathering Technique: User Surveys

Questions:

- :
-

The terminating condition is simple. Once you think you have enough materials to write your report and to support your findings from the different data gathering methods, then you are done with data gathering.