# *School of computing*

# Solution for Assignment 03

## Structured Systems Analysis and Design
## ICT2621

## Semester 1                              2018

**INTRODUCTION**

Dear student,

Note that NO tutorial letters will be sent to you for solutions or any other issue, as was the case some years back. The required information will be found on the module's website, in this case ICT2621, on myUnisa at www.My.Unisa.ac.za. The information will be found under Learning Units, Official Study Materials or Additional Resources on the site. This particular document is under Additional Resources.

This document contains the solutions to Assignment 3 of Semester 1. If there is any error in this solution, an email will be sent to your myLife account to rectify it before the end of the semester. The assignment is marked out 100 marks. It contributes **60%** towards the year mark. The year mark weighs 20% of the final mark.

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# SOLUTION

## FIRST SEMESTER ASSIGNMENT 03    2018,   Total: 100 marks

**NB: For this assignment, if there is any error in numbering of questions by a student, it will be ignored.**

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**Chapter 5 – Data and Process Modelling**

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**Question 1**                                                                              **[28]**

NB: *When drawing data flow diagrams (DFDs), use the Gane and Sarson symbols/notation.*

*Read pages 143 to 160 of the prescribed text book. Then answer the questions 1.1 to 1.5 that follow here below:*

1.1 Name the four main symbols used to draw data flow diagrams (DFDs).  ✓✓✓✓(4)

| |
|---|
| •        Process |
| •        Data flow |
| •        External entity |
| •        Data store |

1.2 Draw *Diagram 1 DFD* that shows the details of the FILL ORDER process in the ORDER SYSTEM (of Figure 5-13 on page 155) found on page 156 in Figure 5-14 of your prescribed book. NB: Only draw figure 5-14.                                                              (4)

   *(Subtract ½ mark for any omission)*  ✓✓ ✓✓
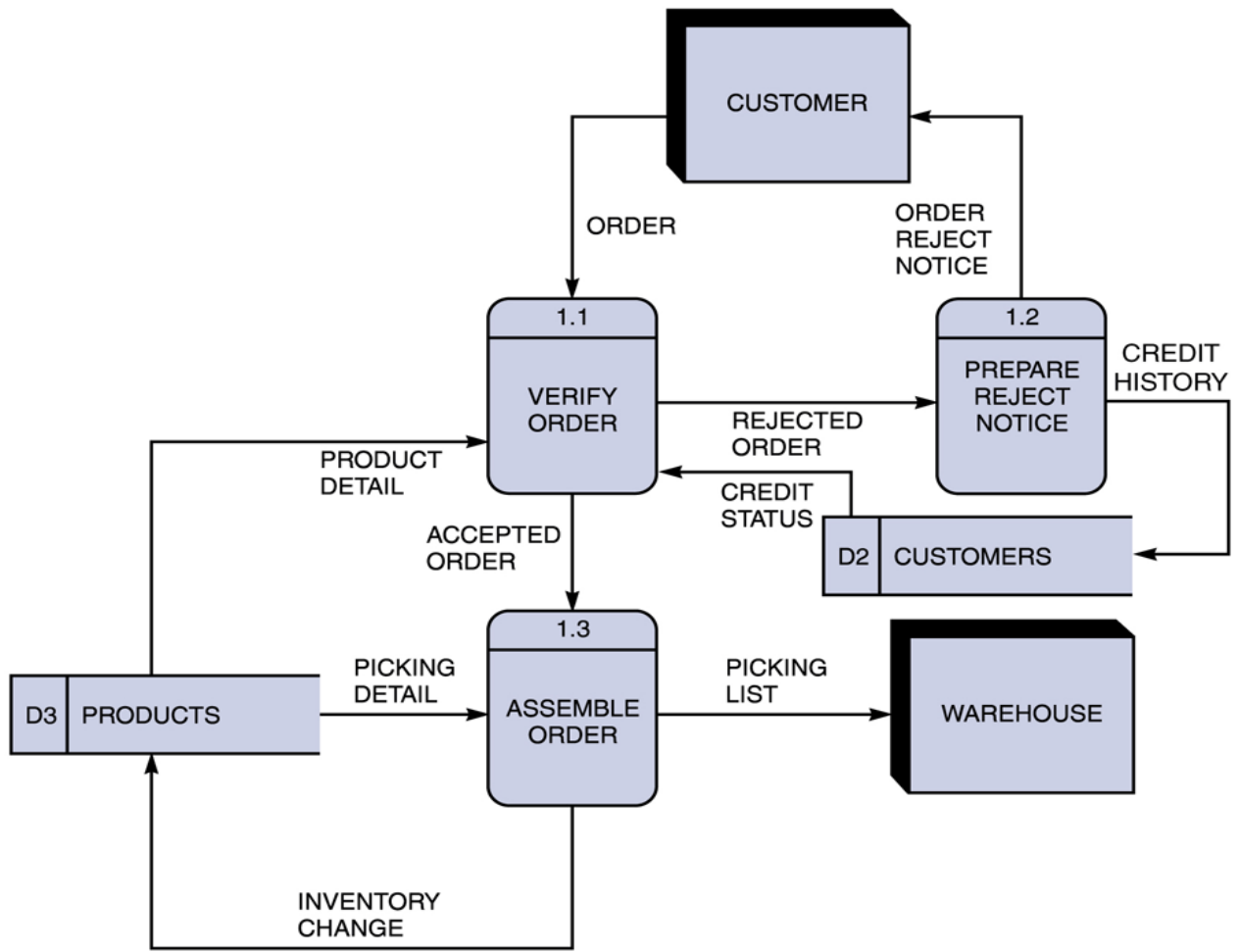
1.3 Define each of the symbols you named in 1.1 and give any two names of examples of each in the diagram you drew in 1.2. Use a table, such as the one below to present your answer. (8)

*(One mark for the definition and ½ mark for each example)* ✓✓ ✓✓ ✓✓ ✓✓

| Symbol name | Definition | Examples |
|---|---|---|
| Process | A process receives input data and produces output that has a different content, form or both. | --Verify order<br><br>--Assemble order<br><br>Or any other in diagram |
| Data flow | A data flow is a path for data to move from one part of the information system to another | --Order    -<br>--Product detail<br><br>Or any other in diagram |
| External entity | A person, place or thing, or event for which data is collected and maintained. | --Customer<br>--Warehouse |
| Data store | A data store represents data that the system stores because one or more processes need to use the data at a | --Products<br><br>--Customers |

| | later time. | |
|---|---|---|

1.4 Describe, in some details, what *Levelling* is in terms drawing DFDs. Then use Figures 5-13 and 5-14 on pages 155 and 156 respectively, to give an example of how this technique can be done. Do not draw the two figures.                                    (5)

The process of drawing a series of increasingly detailed diagrams ✓ (DFDs), until all function primitives are identified ✓ (or … to reach the desired level of detail).

Example: One of the process in diagram 0 (Figure 5-16) is FILL ORDER. In order to fulfil an order, a number of other processes are required ✓ as shown in Figure 5-17. In this case, they are VERIFY ORDER and PREPARE REJECT NOTICE if the order is not successful or ASSEMBLE ORDER if the order is not rejected. ✓ During this processing a number of data flows and data stores may be used ✓

*In awarding the above three marks, the student's explanations are followed. There is no single correct answer. However, the idea should be the same.*

1.5 Describe in some details what *Balancing* is in terms drawing DFDs. Then use Figures 5-13 and 5-14 on pages 155 and 156 respectively, to give an example of how this technique can be done.  Do not draw the two figures.  It is intentional that you do not use Figures 5-15 or 5-16 to answer this question even though the textbook uses these to explain the concept.                                    (3)

A process used to maintain consistency among an entire series of diagrams, including input and output data flow, data definitions and process descriptions. ✓

Or

It maintains consistency among a set of DFD by ensuring that input and output data flows align properly.

Example: In Figure 5-16, the FILL ORDER process receives an ORDER from the CUSTOMER entity and returns the ORDER REJECT NOTICE. It also produces a PICKING LIST which is sent to the WAREHOUSE entity. Balancing means that even when the process, in this case FILL ORDER, is expanded in detail, the inputs and outputs of the more detailed diagram, in this aces Figure 5-17 should remain the same. ✓ This is the case in this situation – just like Figure 5-16, Figure 5-17 receives an ORDER from the CUSTOMER entity and returns the ORDER REJECT NOTICE. It also produces a PICKING LIST which is sent to the WAREHOUSE entity. ✓

*In awarding the above two marks, the student's explanations are followed. There is no single correct answer. However, the idea should be the same.*

1.6 Briefly describe the following with respect to DFDs:

1.6.1  Structured English (2)

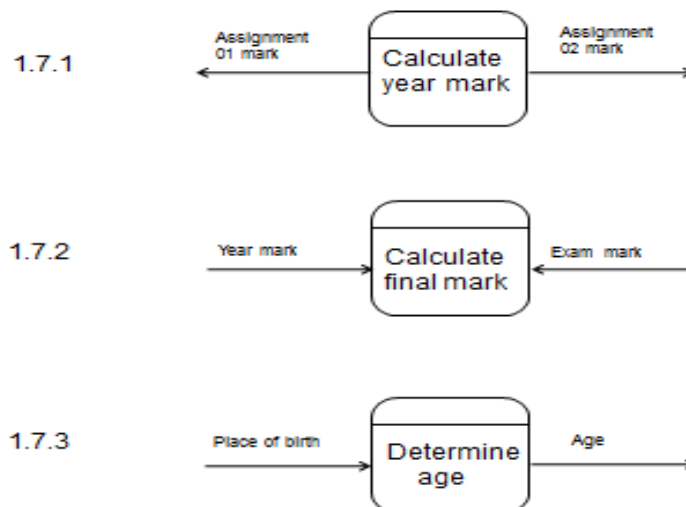Structures English is a subset of standard English✓ that describes logical processes clearly and accurately. ✓

1.6.2  Decision tree (2)

A decision tree is a graphical representation of the conditions, actions and rules✓ found in a decision table. ✓

NB: *Questions 1.7 & 1.8 below are self-assessment exercises. Attempt the questions but DO NOT submit answers for marking. Solutions to these questions will appear together with the solutions to this assignment.*
1.7 Draw a diagram of an example of each of the following showing the process, and the input(s) and output (s), where applicable. You should name each process, input or output used. Do not use the examples from the prescribed test book rather use them as guidelines.

1.7.1

Assignment 01 mark ← → Assignment 02 mark
Calculate year mark

1.7.2

Year mark → Calculate final mark ← Exam mark

1.7.3

Place of birth → Determine age → Age

*1.8 What are the six guidelines for drawing DFDs?* (--)

1.  Draw the context diagram that fits on one page
2.  Use the name of the information system as the process name in the context diagram
3.  Use unique names with each set of symbols
4.  Do not cross lines
5.  Provide a unique name and reference number for each process
6.  *Obtain as much user input and feedback as possible*

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**Chapter 8 – User Interface Design**

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## Question 2 [22]

2.1 The goal of system design is to build systems that are effective, reliable and maintainable. Briefly explain each of these three factors. (6)

> - A system is *reliable* if it handles input errors, processing errors, ✓ hardware failures or human mistakes. ✓
>
> - A system is *maintainable* if it is flexible, scalable✓ and easily modifiable. ✓
>
> - A system is *effective* if it supports business requirements✓ and meets user needs. ✓

2.2 What is Human-Computer Interaction (HCI)? (2)

> HCI describes the relationship between computers and the people✓ who use them to perform (business-related) tasks. ✓
>
> Or
>
> *(For all similar cases in this document, the alternative answer is awarded marks according to the allocation done in the first answer).*
>
> HCI is the study, planning, design and uses of the interaction between people and computers
>
> *Note: similar answers accepted.*

2.3 What are the seven habits of successful interface designers? ✓✓✓✓ (4)

> *Any 7 from the list below (1/2 mark each but give 4 marks if all seven are given).*
>
> 1. Understand the business
>
> 2. Maximize graphical effectiveness
>
> 3. Think like a user
>
> 4. Use models and prototypes
>
> 5. Focus on usability
>
> 6. Invite feedback
>
> 7. Document everything

2.4 Use the internet to find the *ISO 9241-11* standard definition of *usability* with respect to computer interfaces. (1)

Usability is the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use✓ (ISO9241-11, 1998).

*NB: Citation is not part of the answer. There are many other sources on the internet. Only this answer is correct. [Marker: for all other definitions give a zero mark].*

2.5 Why is prototyping important for users during system design? (1)

*Any one of the two:* ✓

- Prototyping allows the users to examine a model that accurately represents system inputs, outputs, interfaces, and processes.

- Prototyping enables users to "test-drive" the model in a risk-free environment and either approve it or request changes.

2.6 When designing a user interface you should follow eight basic guidelines suggested by the textbook authors. List these guidelines? ✓✓ ✓✓ ✓✓ ✓✓ (8)

1 Create an interface that is easy to learn and use
2 Enhance user productivity
3 Provide users with help and feedback
4 Create an attractive layout and design
5 Enhance the interface, *(by including many features such as toolbars, menubars etc. – optional part)*
6 *Focus on data entry screens*
7 *Use validation rules*
8 *Reduce input volume*

NB: *Questions 2.7 below is a self-assessment exercise. Attempt the question but DO NOT submit answers for marking. The solution to this question will appear together with the solution for this assignment.* (--)
*(NB: Please study these in detail.)*

2.7 *The most used forms of output technology for business systems is still in form of screen displays and printed matter. List other current other output types and technologies currently available.* (--)
*(NB: Please study these in detail.)*

*Internet-based information delivery such as emails and blogs*
*Instant-messaging*

> *Wireless devices*
> *Digital audio, images and video*
> *Podcasts*
> *Automated fax systems*
> *Computer output to microfilm (COM)*
> *Computer output to digital media*
> *Specialised forms of outputs such as POS*

*Food for thought:* How would you describe the input and output technology of ***Pokemon Go****? (Optional and not examinable).* **Ignore**

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### Chapter 9 – Data Design

**Question 3** **[16]**

**Scenario:** In any of the finals of the African Cup of Nations soccer tournament, there are a number of countries involved. Each country has a number of players that compete in the tournament. The Federation of International Football Association (FIFA) rules stipulate that a person can only play for one country. Each player has a number of specialists, such as a doctor, financial adviser, etc. to cater for his different needs. A speciality may provide his or her service to one or more players.

3.1 Draw an entity relationship diagram (ERD) for this scenario. The ERD should not contain any many-to-many relationships. Do not include entities that are not in the scope (scenario) provided above. No attributes/fields are required in this section. (8)

*Each entity 1 mark✓✓✓ (4 marks), first two relationships (to PlayerSpecialist) 1 mark each✓✓; Player and country relationship 2 marks✓✓. Naming of associative entity may differ for example Consultation is accepted for PlayerSpecialist)*
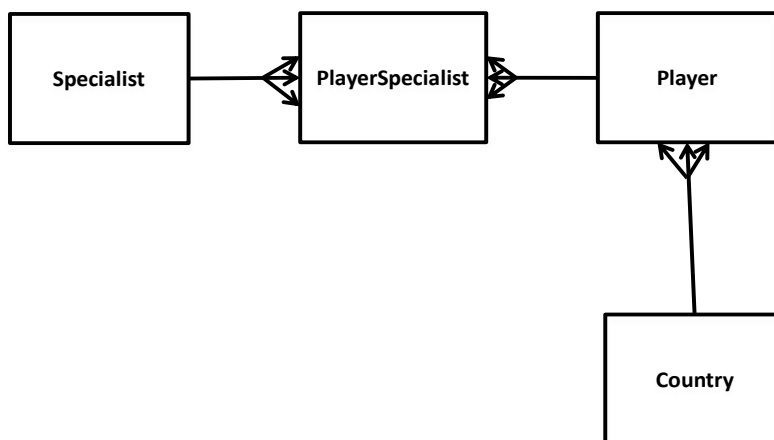
3.2 Create a relational database schema from the ERD in 3.1 showing all tables in 3NF. Each table should include at least three fields. Appropriate primary keys should be used. Primary keys must be underlined and each foreign key should have the letters FK in brackets after it, for instance, xyz (FK). There is no need to show all the steps involved in this process since only the final relational schema will be marked.                    (8)

   NB: A *schema* is simply a list of each table name and its fields/attributes in a database as in the example below.

   Product (<u>Product-Code</u>, Product-name, …)

   Customer (<u>Customer-ID</u>, Customer-name,…)

   etc …

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*1 mark for each entity name and 1 mark for each set of attributes  - at least three attributes  ✓✓ ✓✓ ✓✓ ✓✓*

[*To get the mark for the attributes the primary key must be underlined and letter FK should appear for each foreign key. There must be at least three fields including the primary key. The given fields may be different from these provided.*
*The naming of the primary key may differ, for example, Player-Number instead of Player-ID. The choice of the primary key must be appropriate, for example, Player-last-name cannot be accepted as a primary key.]*

Country (<u>Country-Code</u>, Country-name, County-main-language,)

Player  (<u>Player-ID</u>, Player-first-name, Player-last-name, Player-Age)

PlayerSpecialist (<u>Player-ID (FK)</u>, <u>Specialist-ID(FK)</u>, PlayerSpecialist-Appointment)

Specialist (<u>Specialist-ID,</u> Specialist-Area,  Specialist-name)

| Chapter 11 – Managing Systems Implementation |
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## Question 4 [10]

Draw Figure 11-10 found on page 368 of your prescribed book then explain how the main and sub-modules of this structured chart work together, i.e. what each module/sub-module does and how data is interchanged. Note that you are NOT asked to explain this module in terms of a *control couple* as used in the text book. What is needed is a a general explanation of how structured charts modules and sub-modules work together and how data is exchanged, using this diagram. (10)

*Five (5) marks for the diagram: subtract ½ a mark for any component left out or that is incorrectly drawn. The words "control Couple" are optional.* ✓✓✓ ✓✓
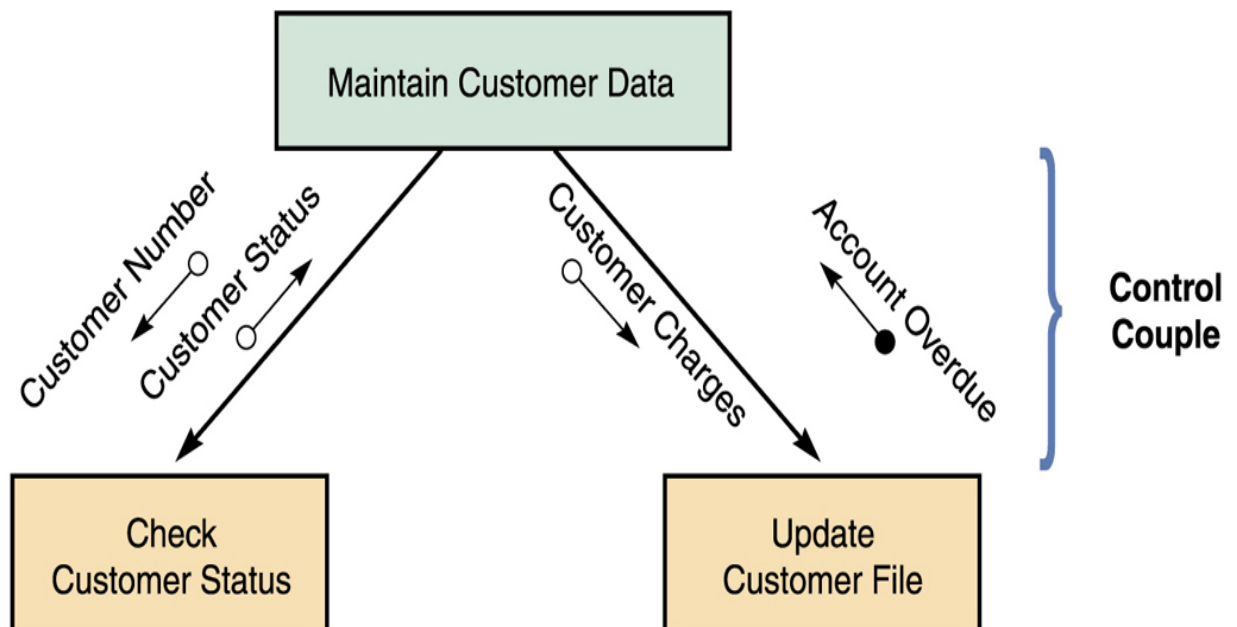


| 1 mark for each tick (5 marks)<br><br>In order to *Maintain Customer Data,* which is the main module in this diagram, ✓ the *Customer Number* is input into the *Check Customer Status* submodule. ✓ This submodule outputs the *Customer Status Data* back to the main module.✓ Likewise, *Customer Charges* are input into the *Update Customer File sub*module✓ which produces the *Account Overdue message for the main module.* ✓ |
| --- |

**Question 5** [10]

For sections 5.1 and 5.2, briefly, describe each with respect to managing systems implementation.

5.1 System testing (2)

System testing involves the testing of an entire information system ✓ and includes all typical processing situations. ✓

5.2 Operational documentation (2)

Operational documentation contains all the information needed for processing✓ and distributing online and printed output. ✓

Explain in, some details, each of the following. You may use the internet for more detailed information. Then, show how each can be used to train users of a software package purchased from a vendor.

5.3 Webinar (3)

A webinar (web + Seminar), is an Internet-based training session✓ that provides an interactive experience. ✓ A vendor may provide training to a number of users over the internet without a need to bring the trainees in a single venue. ✓

5.4 Tutorial (3)

A tutorial is a series of <u>online</u> interactive lessons ✓ that present material and provide a dialogue with users. ✓ Vendor may give users access to this tutorial in order to learn how to use or maintain the product. ✓ (This last part may be worded differently, give the 1 mark if it a valid explanation of the use of tutorials.)

| **Chapter 12 – Systems Support and Security** |
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**Question 6** [14]

Briefly describe each of the following with respect to managing system support and security.

6.1 Perfective maintenance (2)

Perfective maintenance involves changing an operational system✓ to make it more reliable, efficient or maintainable. ✓

6.2 Configuration management (2)

Configuration management, sometimes known as change control, is a process for controlling changes✓ in system requirements during software development. ✓

6.3 Fault management (2)

*Any of the two answers.*

Fault management is a timely detection✓ and resolution of operational problems. ✓

Or

Fault management includes monitoring a system for signs of trouble, logging all system failures, diagnosing the problem and applying corrective action.

6.4 Incremental backup (2)

*Any of the two answers.*

Incremental backup is the fastest backup method✓ that includes only recent files that have never been backed up by any method. ✓

OR

Incremental back is a fast backup method that backs up only the files that have changed since the last full backup.

6.5 The three interactive tasks of risk management (briefly describe each) (6)

- **Risk identification**✓ analyses the organisation's assets threats and vulnerabilities. ✓

- **Risk assessment**✓measures risk likelihood and impact. ✓

- **Risk control**✓ develops safeguards that reduce risks and their impact. ✓

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