Process Management for ICT Engineering

Course Assignment 1: Remma 1000

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Software Technology Engineering

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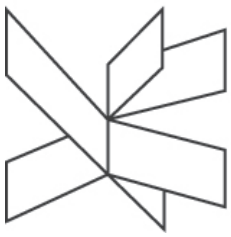

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1 External interface requirements

1.1 Users interfaces

In order to implement an intuitive, friendly user interface that the user can learn in the shortest possible time, it will be necessary to implement the following characteristics in the GUI:

1. The interface must contain a numeric keyboard that allows the user to enter at least two values (price of the object and discount to apply) and when pressing a button the final price of the object is displayed and saved on the screen.
2. The interface must be able to incorporate a button that allows dividing the total price of an item by the amount that the user wants.
3. The interface must be able to incorporate a purchasable units button that given the introduction of 2 numerical values by the user, the entire result of the division between available money and the price of each unit is returned on the screen.
4. The interface must be able to incorporate a remove button that remove previously added items and readjust the total price of the basket.
5. The interface must be able to incorporate a button that allows calculate the total price of a product given two values kilogram and price per kilogram.
6. The interface must be able to incorporate a button that allows to calculate the reciprocal value of a number and allows to affirm (with a green tick) or deny (with a red tick) if the number is prime or not, respectively.
7. The interface must be able to incorporate a button that allows to calculate if a liquid object (total in liters) that has been added in the shopping cart can fit in a football given a diameter that the user will add.
8. The calculator must be able to modify the values entered by the user and consequently modify the total price of the basket.
9. The calculator must be able to store the total price of a purchase and the total price of each object.

1.1.1 Hardware interfaces

The device will consist of a touch screen that will allow the user to press all the necessary buttons to use the calculator correctly. The inside of the hardware will be composed of a Raspberry Pi which is a microcomputer board.

1.1.2 Software interfaces

The calculator (by having the Raspberry Pi installed) will have the Android Pie 9.0 operating system and a mobile calculator application will be created so that the user can use it.

1.1.3 Communications interfaces

The calculator will use the bluetooth device, wifi, nfc and if necessary 4G connection

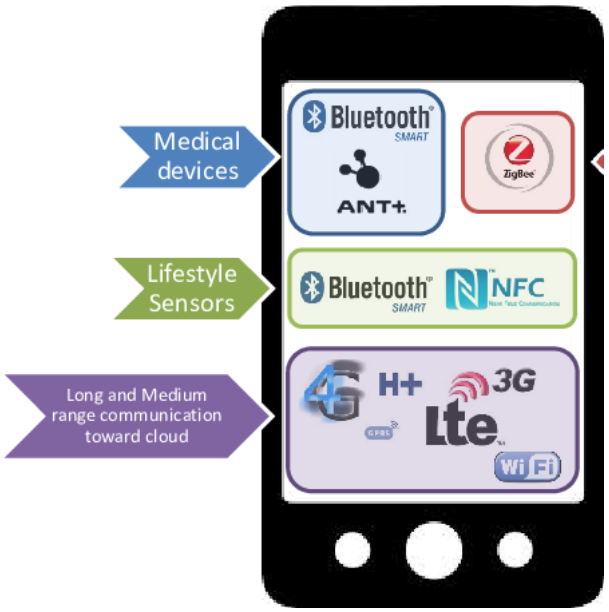

Figure 1: Communication interfaces of the calculator

2 Functional requirements

2.1 Information flows

2.1.1 Data flow diagram 1

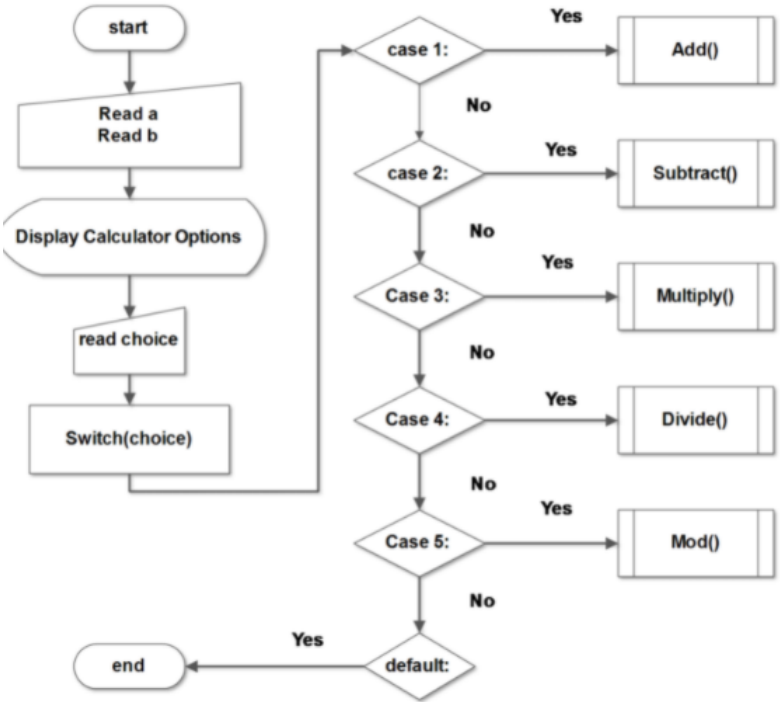

Figure 2: Communication interfaces of the calculator

2.1.1.1 Data entities

- User: this entity will be in charge of saving the data of each user who uses the calculator (user, password, number of total purchases, total purchase price).
- Purchase: this entity is responsible for storing all the information of each purchase made by the user
- Database: this entity is in charge of storing all the information of the user entity and purchase entity.

2.1.1.2 Pertinent processes

The user will make use of the calculator of all the functionalities added in the user interface, modifying the total value of the purchase based on the processes that the decision maker executes in the calculator.

2.1.1.3 Topology

The topology of the basic functionalities of the calculator will go as it can be seen in the figure 3.

2.1.2 Process descriptions

2.1.2.1 Process 1

The user enters the necessary data to execute some of the internal operations of the calculator or will select some pre-established functionality within the calculator.

2.1.2.1.1 Input data entities

- User: must enter values and/or select a preset functionality

2.1.2.1.2 Algorithm or formula of process

The calculator internally will be able to calculate:

- Multiply megabyte.
- Volume sphere: $\frac{4}{3}\pi r^3$
- Multiply.
- Divide.
- Subtract.
- Add.
- Calculate the reciprocal value of a number.
- Calculate the total price of an item after applying a discount (%).

2.1.2.1.3 Affected data entities

All entities will be affected during the use of the calculator

2.1.3 Data construct specifications

2.1.3.1 Construct 1

The calculator must be built to withstand drops of more than 2 meters. It will also have to have resistance to dust and water IP-68.

2.1.3.1.1 Record type

Electromagnetic compatibility (EMC) is the ability of electrical equipment and systems to function acceptably in their electromagnetic environment, by limiting the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference (EMI) or even physical damage in operational equipment. The goal of EMC is the correct operation of different equipment in a common electromagnetic environment. It is also the name given to the associated branch of electrical engineering.

2.1.3.1.2 Constituent fields

2.1.4 Data dictionary

2.1.4.1 Data element 1

Operation.

2.1.4.1.1 Name

In mathematics, an operation is a function which takes zero or more input values (called operands) to a well-defined output value. The number of operands (also known as arguments) is the arity of the operation.

2.1.4.1.2 Representation

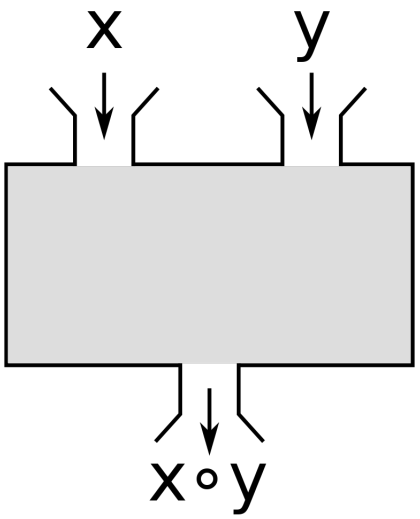

Figure 3: A binary operation takes two arguments x and y, and returns the result x$\circ y$.

2.1.4.1.3 Units/Format

Integers and decimals.

2.1.4.1.4 Precision/Accuracy

The precision will be only 2 decimal places.

2.1.4.1.5 Range

The range will be *long* 64 bits 2^{63}–1

3 Performance requirements

- Performance Requirements Gathering and Analysis.
- Design for Performance and Performance Modeling.
- Unit Performance Tests and Code Optimization.
- Performance Testing.
- Performance Monitoring and Capacity Management.

4 Design constraints

Design is an important part of creating a product, not only from the customer's point of view. Especially if it comes to aspects such as marketing, it is essential to have a design that meets all customer's expectation. In the context of application development, the term design distinguishes from the common sense of "design", focusing on more than the colour of the interface. Within application development it is crucial to create a visual and functional consistency. Next to the creation of appealing design elements like buttons, labels and colours (visual consistency), the application should function similarly through all elements (functional consistency) and should offer an logical workflow to allow the end user to "understand" the application easily.

5 Software system attributes

- 1) Reliability
- 2) Maintainability
- 3) Usability
- 4) Portability
- 5) Correctness
- 6) Efficiency
- 7) Integrity or Security
- 8) Testability

- 9) Flexibility
- 10) Reusability
- 11) Interoperability

6 Non-functional requirements

1. Intuitive understandable GUI.
2. Delay in data transmission.
3. Simultaneous transmission of data at least 15 users at the same time.
4. Error notification on failed database connection
5. Time to make the calculus max 0.5 seconds.
6. Free of charge for end users.
7. Modular scalable.