Software Development Overview

My name is Reynold Chidziva. I love working with computers quite proficient in software development and managing databases.

I wanted to make a versatile software that is easy to use and makes exams less of a hassle. By making use of this app, it removes the issue involved regarding the long and time-consuming login procedures to write the exam.

With the use of this app, we can easily avoid all these steps with a few clicks.

The software is also aiming not only to provide inconvenience for students but also for hosts and lecturers as well. The host can monitor the number of students who have logged in to the system for their exam. It also provides an environment for lecturers to create exam question papers as well as analyze student data.

The software makes use of everything I've learnt over the years in IT. With this knowledge, this software solution can solve the issues I've found when interacting with the portal.

Regards

Reynold Chidziva

Contents

Project Overview

The project is to set up an innovative Online Exam Portal for UNISA. The goal of the project is to offer a simpler and easier to understand portal for the students to conduct their exams. It aims to offer the exam department with extra functionality for more streamlined monitoring, information extraction, and more.

It makes the exam conduct a less strenuous and complicated affair as the functionality one requires are available via the app.

Menus for the Host, Lecturer and Student are available. For the Host, I wanted to offer them versatile functionality. The host can monitor login details of students/lecturers who have logged in, have customizable options for report analysis and change student, module, and lecturer information. The Host can add, remove, or edit this information as well.

Lecturer menu provides an interface to create exam questions and analyze student data. Student's menu has their registered modules containing exam dates and duration. Exam papers are available to the student during their exam date. They can view their exam paper within the app, preventing them from going back and forth between windows/apps. In addition, they can also return back to a previously unfinished paper in the event of power outage or accidental closure of the app.

I will make the app available on PC and Android devices because of the high capacity of users who use these devices. A large majority of UNISA students use these devices during the exams. I will release future ports for Linux and Apple soon.

The apps used for development have been used in the past with outstanding success. They made the development of the app a quick and simple process, allowing for rapid testing on many devices with different screen orientations.

I will distribute the software via a website. They will be available as an install file or an already unpacked version that is extractable and ready to use. Android users will download the application of the file via the website as well.

The system can support many connected students. Most of the resource intensive tasks take place client side. The host will take a hit during the download and upload stages. This means the host needs a powerful enough CPU for requests. In addition, the client is to have a consistent online connection to conduct their operations. Ownership of intellectual property – the client will have full ownership of the ip as well as the source code. They can make their own personal modifications to the application as they see fit.

The testing of the project will first be conducted locally to prove everything is functioning as it should. Should the system be setup for online use, it will require an online Database Server connection. This will be required when students connect to the server.

The project will continue to receive support after the project's hand-ins such as giving teaching resources over its uses and installation support.

Should any issues arise with the system, assistance will be provided to ensure everything is up and running once more.

Technology requirements

Hardware

For PC users, the portal app will run from Windows 7, 8, 8.1 and 10 in 32 and 64 bit. The installation size will be 100 MB or more, requiring they have enough free space for the installation.

The hardware requirements for Android users will be from Android 5 to the latest version. Users will need a consistent internet connection.

Software

Unity – This software is what I used to develop the front end of the application. It was my choice due to its ease of use and familiarity. It also allows for the easy export to other platforms and operating systems such as Android, Apple, and Linux with a few steps.

Visual Studio – This is the software I have used to develop the code for the front end. I chose it due to its simple interface, intellicode and its integration with Unity, making the programming of the software seamless and hassle free.

NetBeans – I utilized NetBeans to develop the backend of the system. I used it due to familiarity and having past successes with it.

phpAdmin. phpAdmin is what I have utilized as my database manager. It has an easy to understand and use interface. Though when the app will be implemented for online, a more dedicated Database Manager will be required for online uses.

Obstacles

Resolution scaling–Devices are available in multitudes of varying sizes. This will be an issue if you have developed the system on one screen size without taking other sizes into consideration. I will conduct testing over various screen sizes along with adjusting settings to make these accommodations. This will provide a pleasant experience for users interacting with the system on their device.

Power outages–Occasionally, power goes off in my area because of a faulty cable or load shedding. This can lead to loss of production and valuable time required to create the software. To circumvent this issue, a modem and laptop with an adequate battery life can help to overcome this issue till the electricity returns to allow full software production, with the modem being purchased later in the month.

Loss of project files- Occasional backups to the system project files are being made locally every weekend in case any issue may arise that will wipe away all progress made to develop the system.

The new system's design is non-intrusive. It is possible to run both the old and new system simultaneously. Over time, the transition from the old to the new system will cause no hiccups or issues caused by the transition.

Deployment

Backup and recovery

For data backup and recovery, I created a new app called UNISA Database Backup. Its job is to back up the database data according to the specifications set in the settings menu of the app. It can be set to create a manual backup immediately or automatically. It also has a restore process that will seamlessly restore the backup data to the system.

For the system in case of system failure, the host can simply rerun the app or run it on another computer with a network connection. The clients however will need to reconnect to the system to continue but for any unsaved work/changes, these will be temporarily stored on the client's device as they await to resubmit the data to the server/host.

For code backup, I have utilized Version Control on GitHub through Unity to handle the code backup for the system.

Documentation

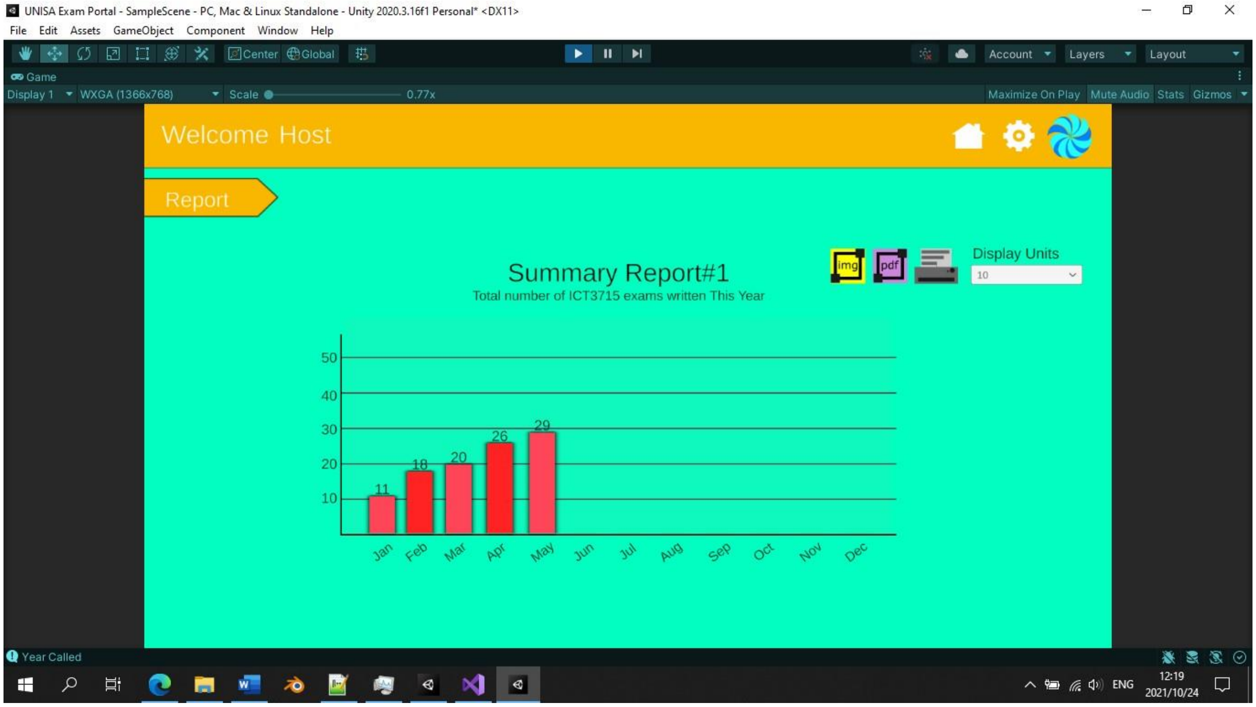
The documents I will be submitting will be Installation documents as well as the User manual.

Installation documents on how to setup the system as well as the backup software.

User instructional manual will be made available in regards to system operations.

Reporting

Summary Report #1


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>

Welcome Host

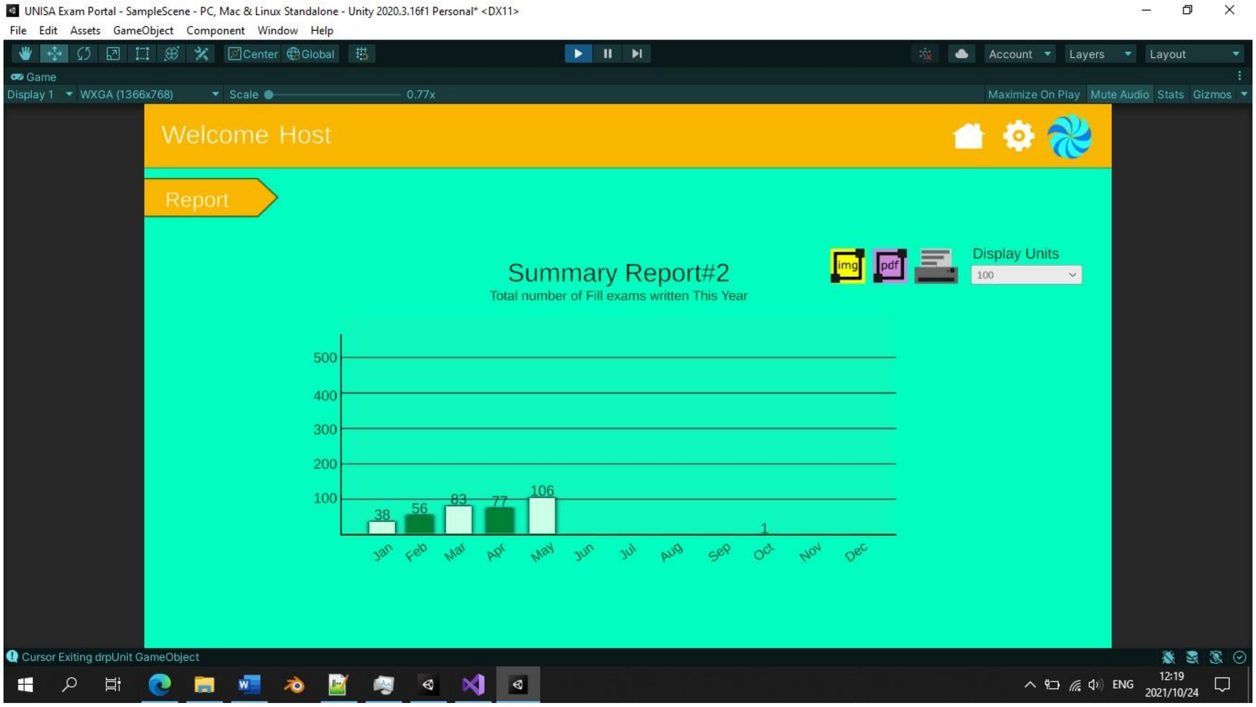
Summary Report#1

Total number of ICT3715 exams written This Year

Display Units: 10

Year Called

Summary Report #2


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>

Welcome Host

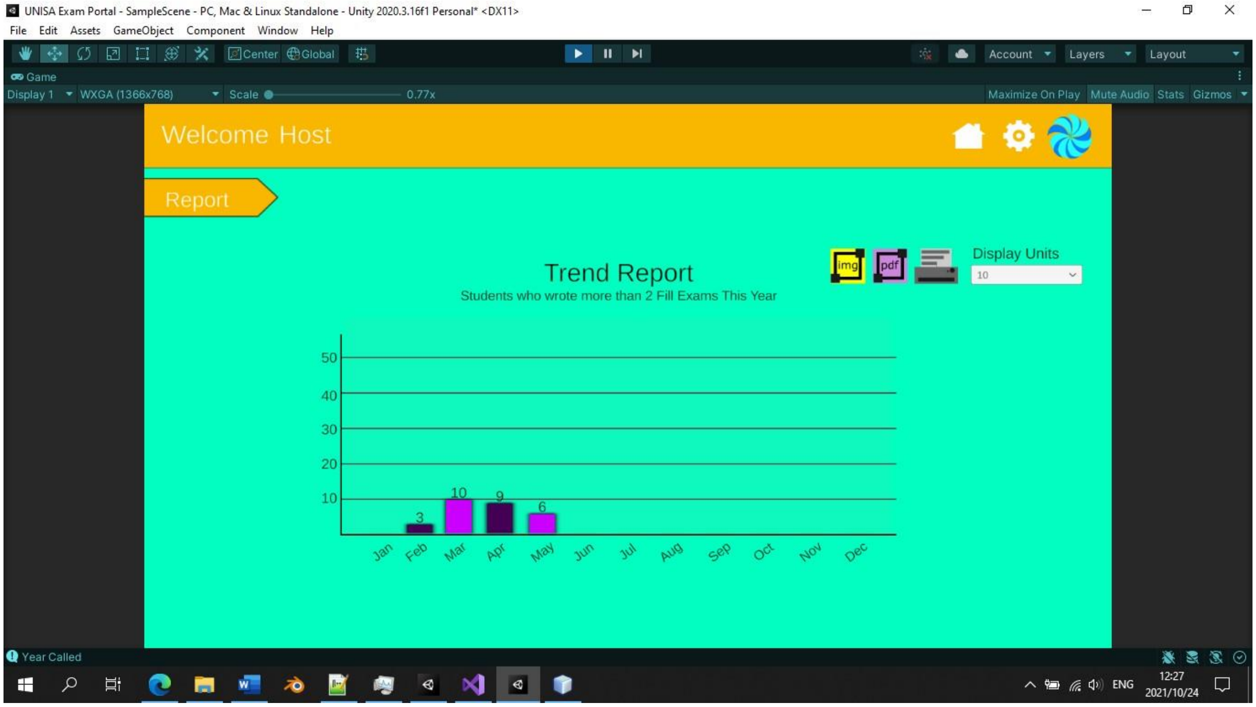
Summary Report#2

Total number of Fill exams written This Year

Display Units: 100

Cursor Exiting drpUnit GameObject

Trend Report



UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>

Welcome Host

Report

Trend Report

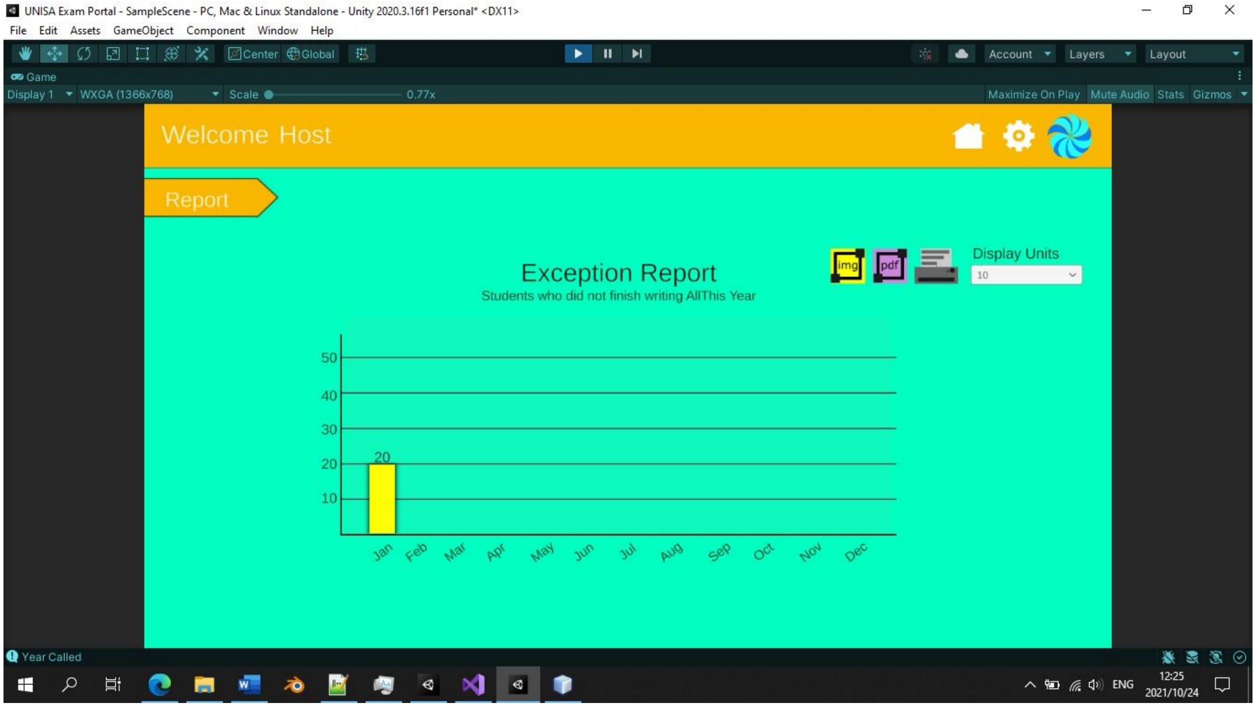
Students who wrote more than 2 Fill Exams This Year

Display Units: 10

Year Called

File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
img pdf
50
40
30
20
10
3
10
9
6
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
ENG 12:27 2021/10/24

Exception Report



UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>

Welcome Host

Report

Exception Report

Students who did not finish writing AllThis Year

Display Units: 10

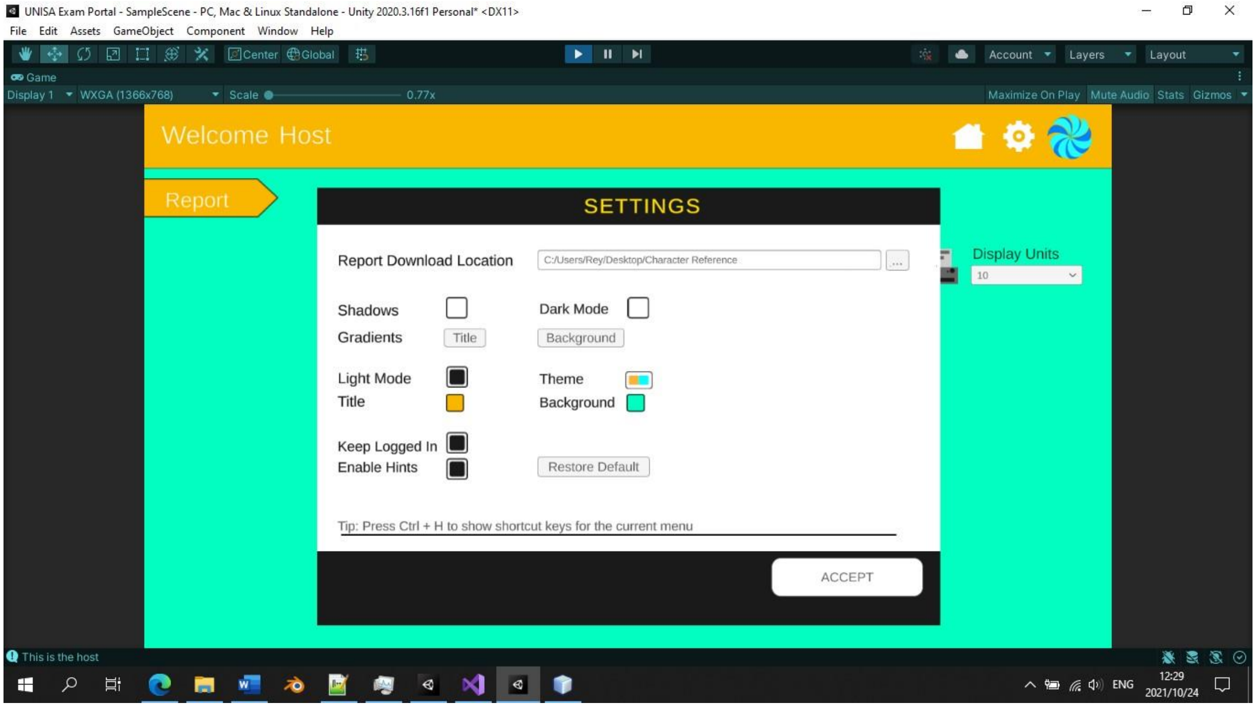
Year Called

File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
img pdf
50
40
30
20
10
20
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
ENG 12:25 2021/10/24

Evidence

System Admin

The system administrator is responsible for setting up the host before they go online. They make changes to host login details as well as specify the database’s config such as username, password, server etc. They are the only user that can interact with the system offline. **Settings**


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Host
Report
This is the host
ENG 12:29 2021/10/24

SETTINGS

Report Download Location: C:/Users/Rey/Desktop/Character Reference ...

Display Units: 10

Shadows □ Dark Mode □

Gradients: Title Background

Light Mode ☑ Theme ▨

Title 🟧 Background 🟩

Keep Logged In ☑

Enable Hints ☑ Restore Default

Tip: Press Ctrl + H to show shortcut keys for the current menu

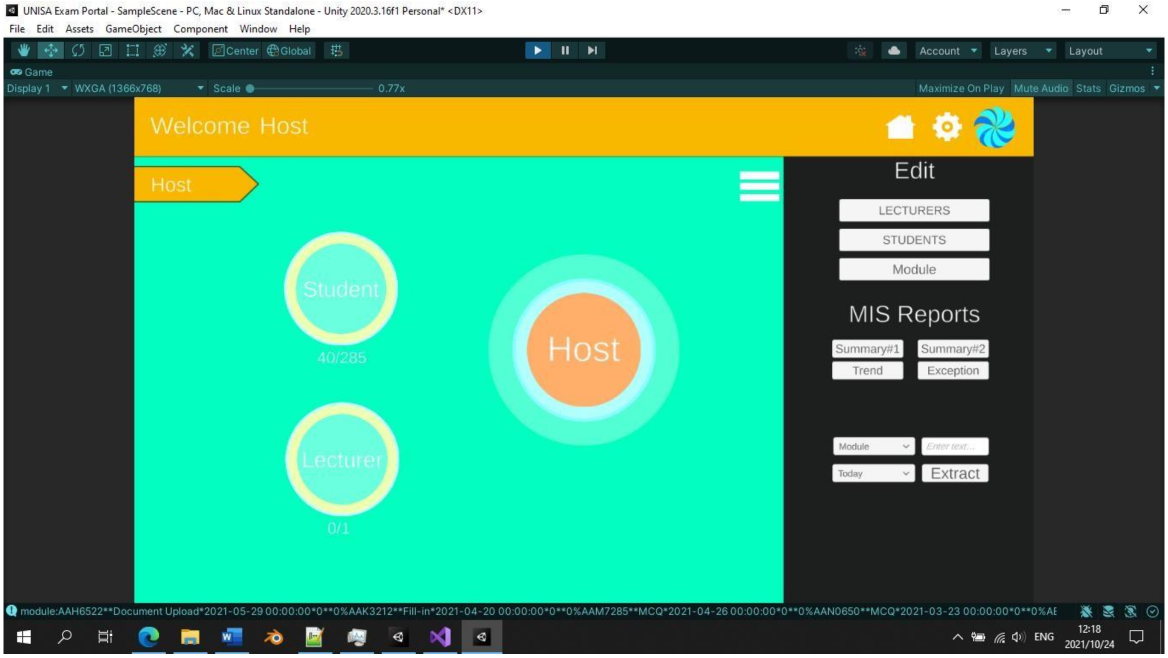
ACCEPT

The settings menu allows the user to make customization options to match their needs. The download location specifies the location where the exam paper is to be stored. For the host version of settings, it is presented as Report Location which specifies the location the report downloads are to be stored.

Color and shadow options are provided for the student to make changes to the backgrounds, titles, headers. Keep Logged In setting allows the user to be automatically logged in the next time they access the system. The Display hints allows/disallows the showcasing of hints on system functions.

Restore defaults resets the menus to their default settings. It provides benefits as with a more pleasant interface to interact and work with, the less tense they are.

Host – Main

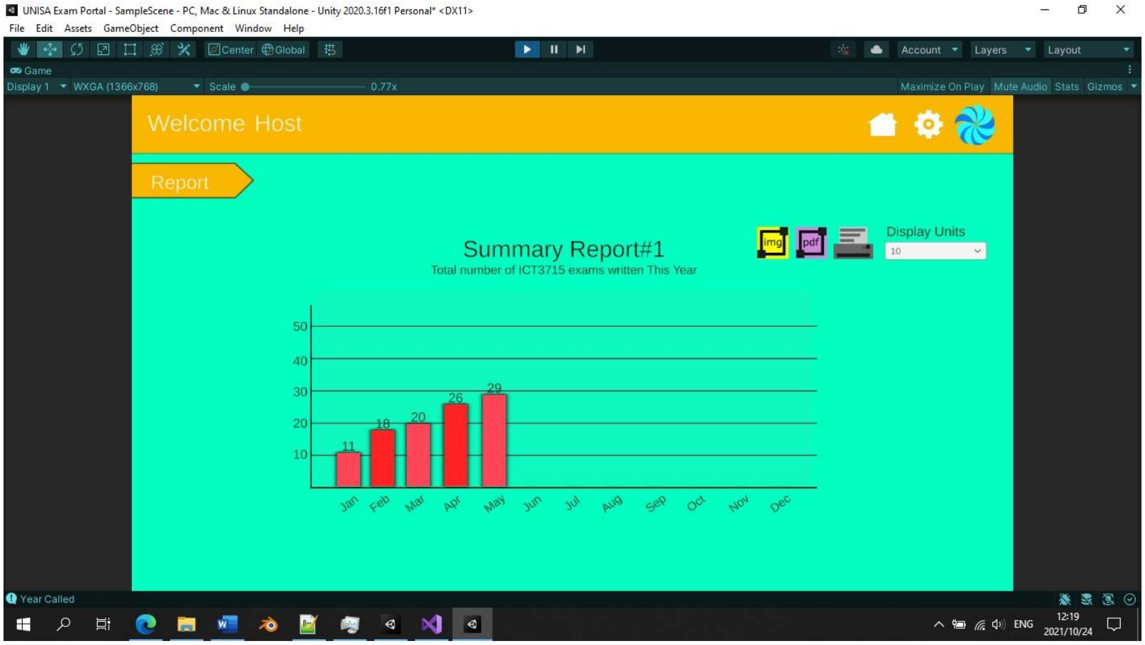

UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Host
Host
Student
40/285
Host
Lecturer
0/1
Edit
LECTURERS
STUDENTS
Module
MIS Reports
Summary#1
Summary#2
Trend
Exception
Module
Enter text...
Today
Extract
ENG
12:18
2021/10/24

```
module:AAH6522**Document Upload*2021-05-29 00:00:00*0**0%AAK3212**Fill-in*2021-04-20 00:00:00*0**0%AAM7285**MCQ*2021-04-26 00:00:00*0**0%AAN0650**MCQ*2021-03-23 00:00:00*0**0%AE
```

This illustration showcases the Host’s main menu. The left panel showcases students and lecturers who are currently logged into the system. This is used to measure the total number of students currently writing their exam. At the top right corner are tabs the user can click to showcase more options.

The host can make changes to information regarding Students, Lecturers and Modules. This allows the Host to add, remove or update this information. Below it showcases the inputs required to extract reports. The user can give specific dates if the need arises to extract data according to the user’s wishes.

Host -

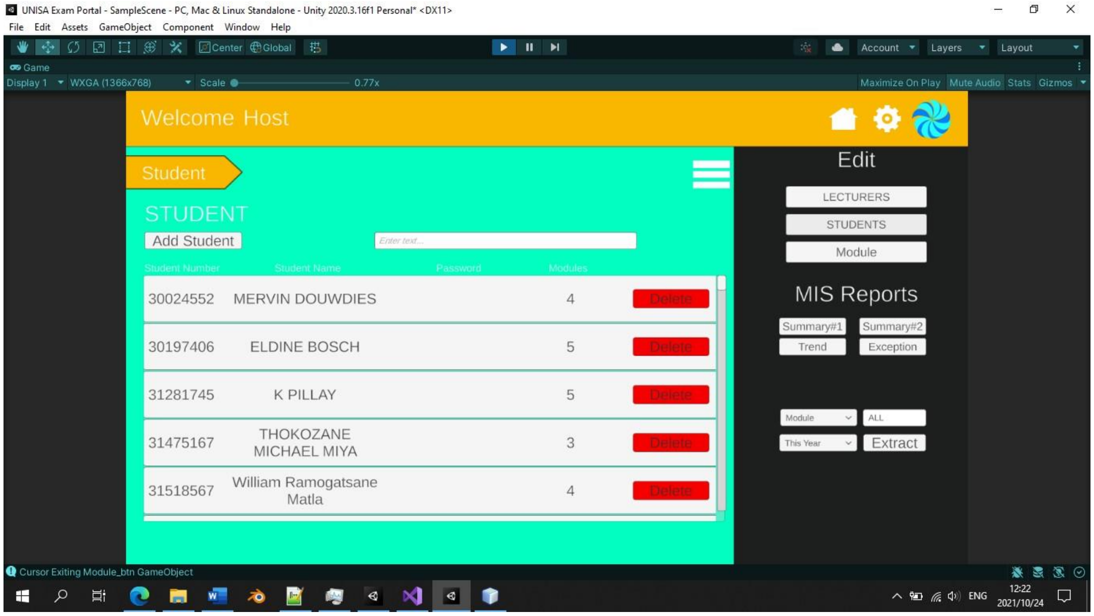

UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Host
Report
Summary Report#1
Total number of ICT3715 exams written This Year
img
pdf
Display Units
10
50
40
30
20
10
11
18
20
26
29
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Year Called
ENG
12:19
2021/10/24

Reports Page

This is the reports page. The information on display is what was specified in the Host Main screen. At the top right corner are display units, pdf, image buttons. For the display units, in case the results are too small to read/department wants an overview of what they are seeing, the display units can easily be customized. This affects the y axis as it scales the units to view the information in a manner that is comfortable for the user.

The pdf and image buttons are print buttons. They allow you to save the report information in pdf or image formats for later use.

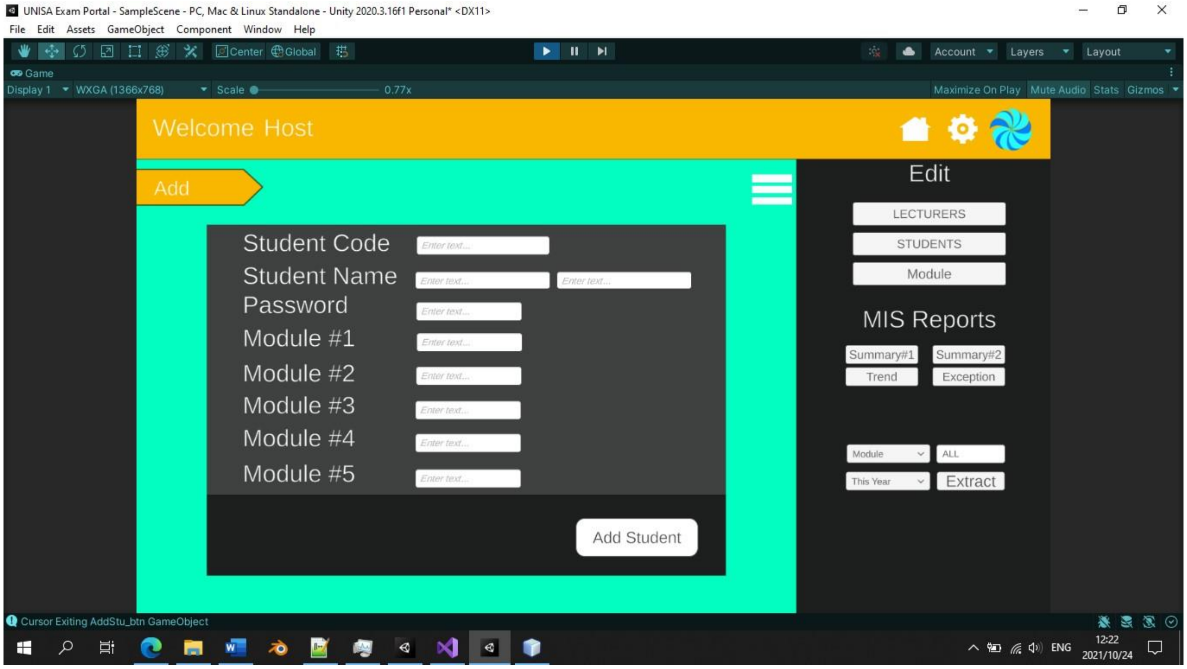
Host – Modules Page


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Host
Student
STUDENT
Add Student
Enter text...
Edit
LECTURERS
STUDENTS
Module
MIS Reports
Summary#1
Summary#2
Trend
Exception
Module
ALL
This Year
Extract
Cursor Exiting Module_btn GameObject
ENG 12:22 2021/10/24

Student Number	Student Name	Password	Modules	
30024552	MERVIN DOUWDIES		4	Delete
30197406	ELDINE BOSCH		5	Delete
31281745	K PILLAY		5	Delete
31475167	THOKOZANE MICHAEL MIYA		3	Delete
31518567	William Ramogatsane Matla		4	Delete

This illustration showcases modules obtained from the database. Options are also available for Lecturer and Student information in similar formats. The delete button allows the host to delete the modules. When the module is clicked, the host is redirected to a page to update that module. When the top left ‘Add module’ button is pressed, the host is redirected to a page but this time to add a new module.

Host – Adding Modules

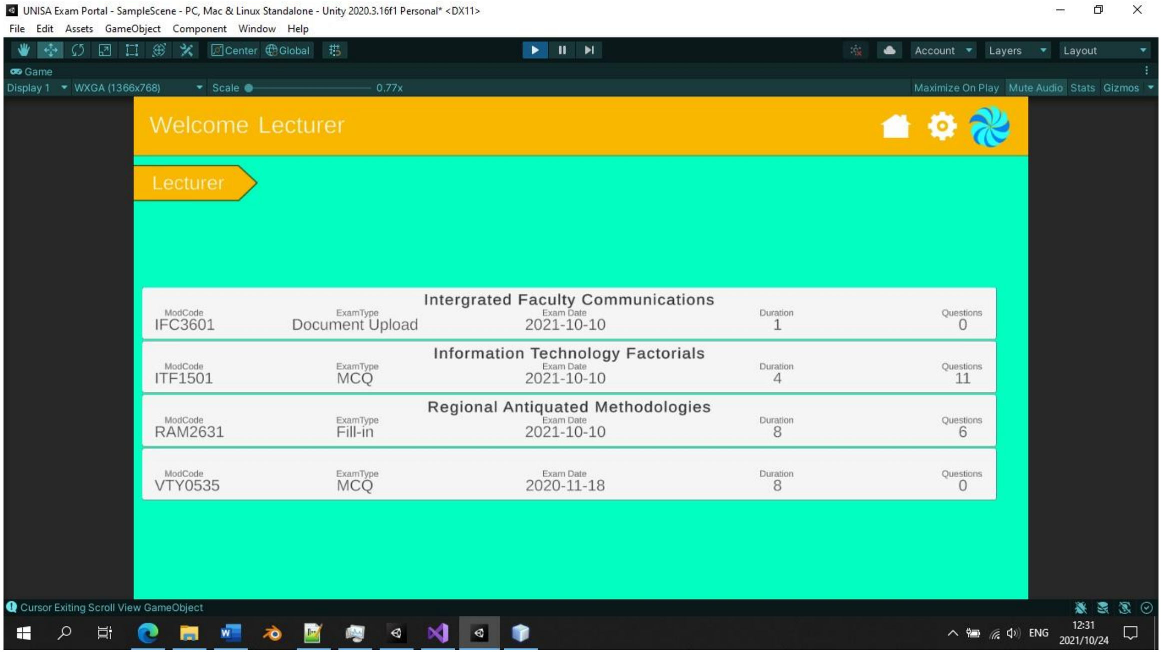

UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Host
Add
Edit
LECTURERS
STUDENTS
Module
MIS Reports
Summary#1
Summary#2
Trend
Exception
Module
ALL
This Year
Extract
Cursor Exiting AddStu_btn GameObject
ENG 12:22 2021/10/24

Student Code	Enter text...
Student Name	Enter text... Enter text...
Password	Enter text...
Module #1	Enter text...
Module #2	Enter text...
Module #3	Enter text...
Module #4	Enter text...
Module #5	Enter text...

Add Student

This menu allows the user to add modules to the subject. They make use of the input fields and dropdowns to enter details. The results get saved directly to the database.

Lecturer – Main



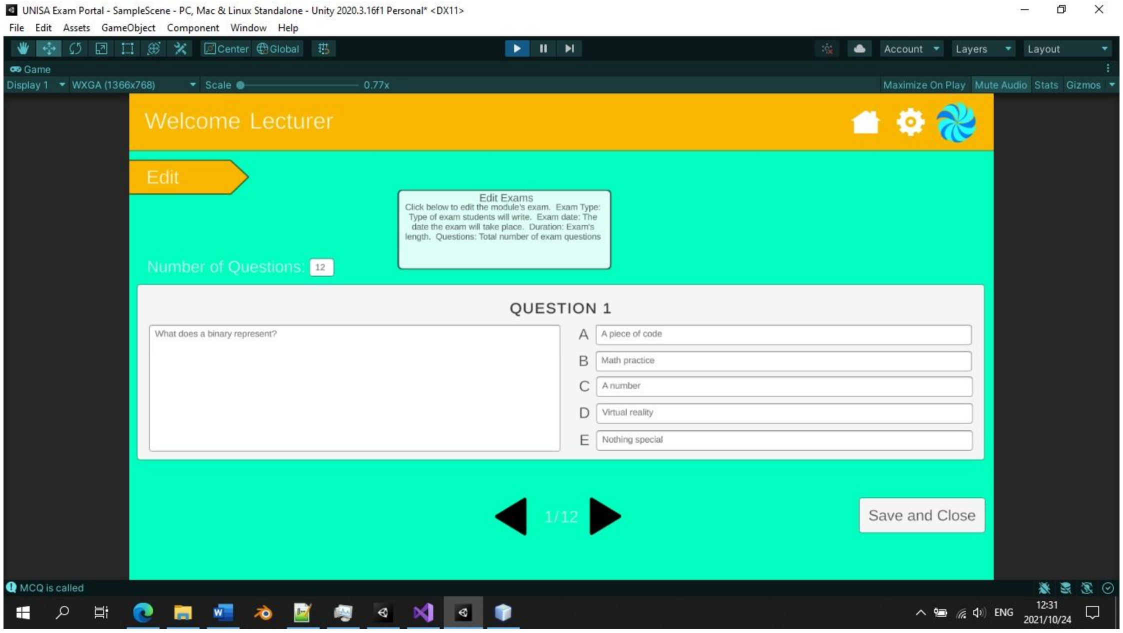
UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Lecturer
Lecturer
ENG 12:31 2021/10/24

ModCode	ExamType	Exam Date	Duration	Questions
Intergrated Faculty Communications				
IFC3601	Document Upload	2021-10-10	1	0
Information Technology Factorials				
ITF1501	MCQ	2021-10-10	4	11
Regional Antiquated Methodologies				
RAM2631	Fill-in	2021-10-10	8	6
VTY0535	MCQ	2020-11-18	8	0

Cursor Exiting Scroll View GameObject

This menu is the Lecturer menu. This allows the lecturer to create exams using a wide variety of tools and with convenience. The lecturer is presented with modules that were assigned to them by the host.

Lecturer - Add MCQ



UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Lecturer
Edit
1/12
Save and Close
ENG 12:31 2021/10/24

Edit Exams
Click below to edit the module's exam. Exam Type: Type of exam students will write. Exam date: The date the exam will take place. Duration: Exam's length. Questions: Total number of exam questions

Number of Questions: 12

QUESTION 1

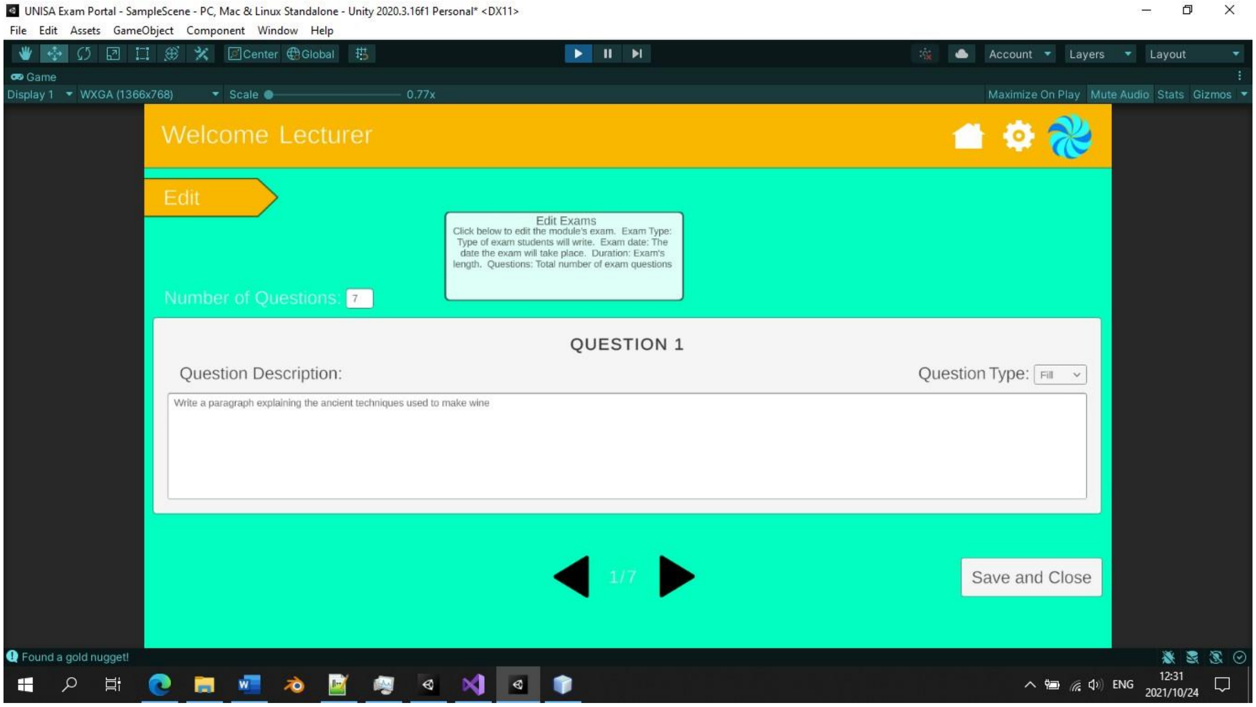
What does a binary represent?

A A piece of code
B Math practice
C A number
D Virtual reality
E Nothing special

MCQ is called

This menu allows the lecturer to edit MCQ exams. The description is where the lecture provides the question. On the side are A, B, C, D, E. These are the options the student will select to pick the correct answer.

Lecturer - Add fill


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Lecturer
Edit
QUESTION 1
Question Description:
Question Type:
1/7
Save and Close
Found a gold nugget!
ENG 12:31 2021/10/24

Edit Exams
Click below to edit the module's exam. Exam Type: Type of exam students will write. Exam date: The date the exam will take place. Duration: Exam's length. Questions: Total number of exam questions

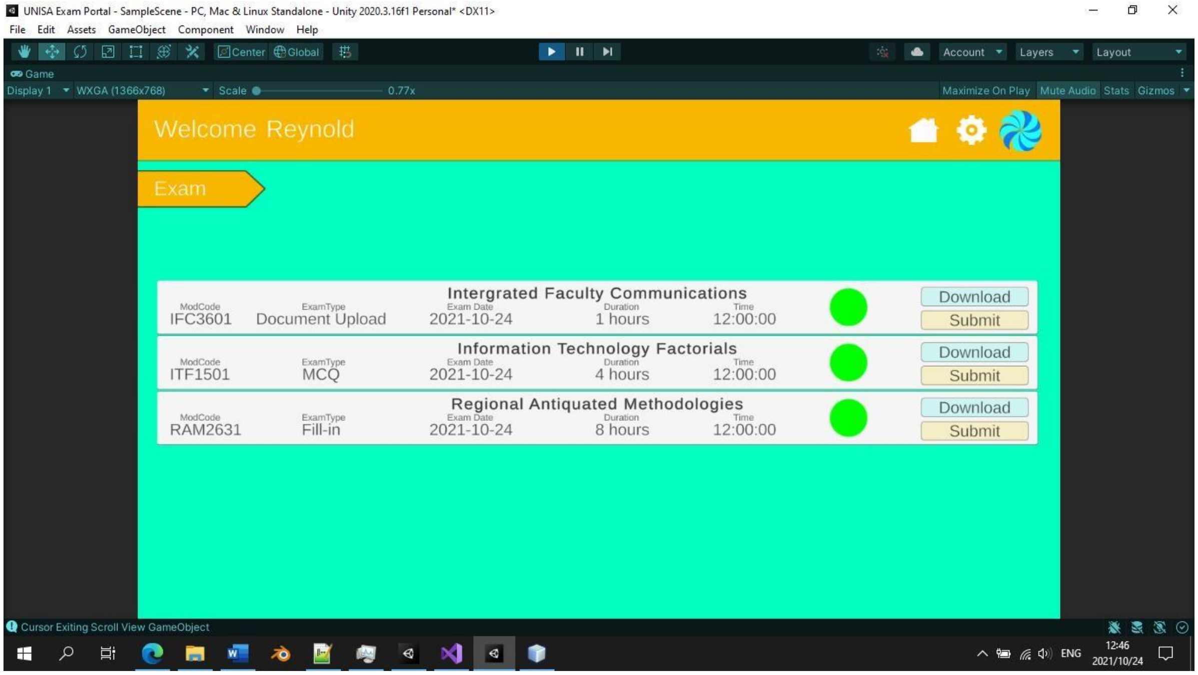
Number of Questions: 7

Question Type: Fill

Write a paragraph explaining the ancient techniques used to make wine

This menu allows the lecturer to edit Fill exams. As before, the description is where the lecturer enters the exam question. Next to it is a dropdown menu for 'Type'. This allows the lecture to specify if the answer should be a Fill or Image answer.

Student – Main


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
ENG 12:46 2021/10/24

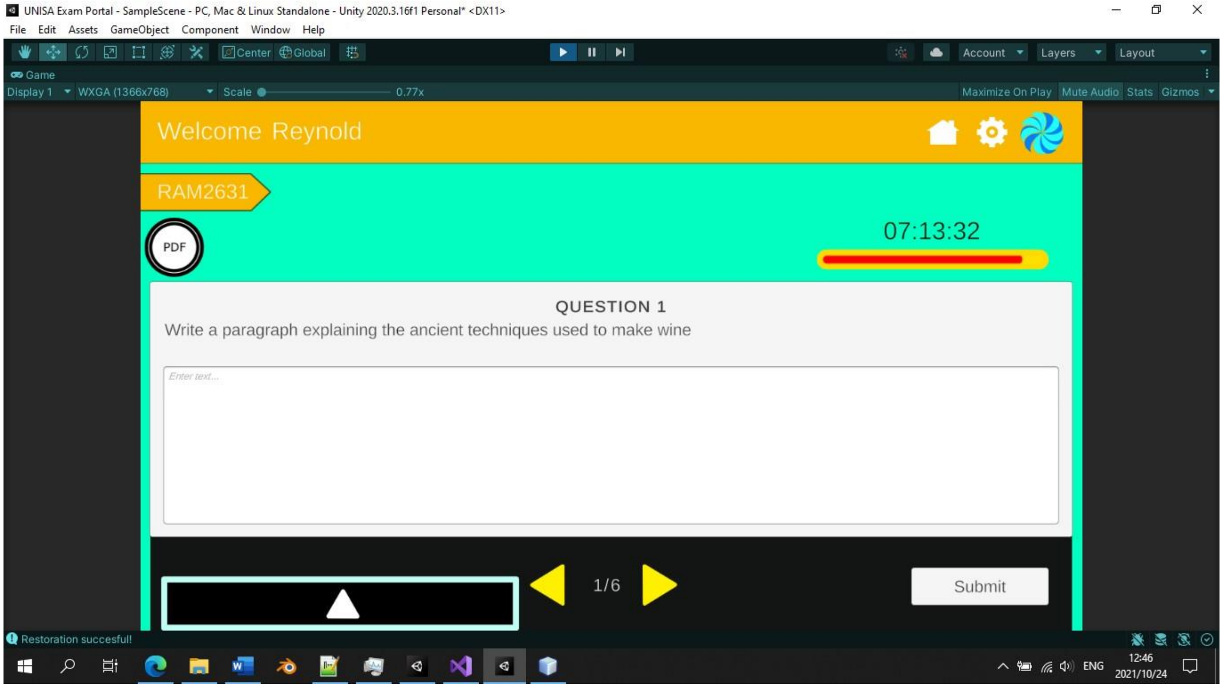
Welcome Reynold

Exam

ModCode	ExamType	Exam Date	Duration	Time		
Intergrated Faculty Communications						
IFC3601	Document Upload	2021-10-24	1 hours	12:00:00	●	Download Submit
Information Technology Factorials						
ITF1501	MCQ	2021-10-24	4 hours	12:00:00	●	Download Submit
Regional Antiquated Methodologies						
RAM2631	Fill-in	2021-10-24	8 hours	12:00:00	●	Download Submit

Cursor Exiting Scroll View GameObject

This is what is presented to the user when they have successfully logged into the system. Their modules are on display, also showcasing the relevant information sch as the exam data, type, and its duration. The buttons on the right for Submit/Download will only be made available during the exam. **Student - Fill exam menu**


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
PDF
1/6
Submit
ENG 12:46 2021/10/24

Welcome Reynold

RAM2631

07:13:32

QUESTION 1

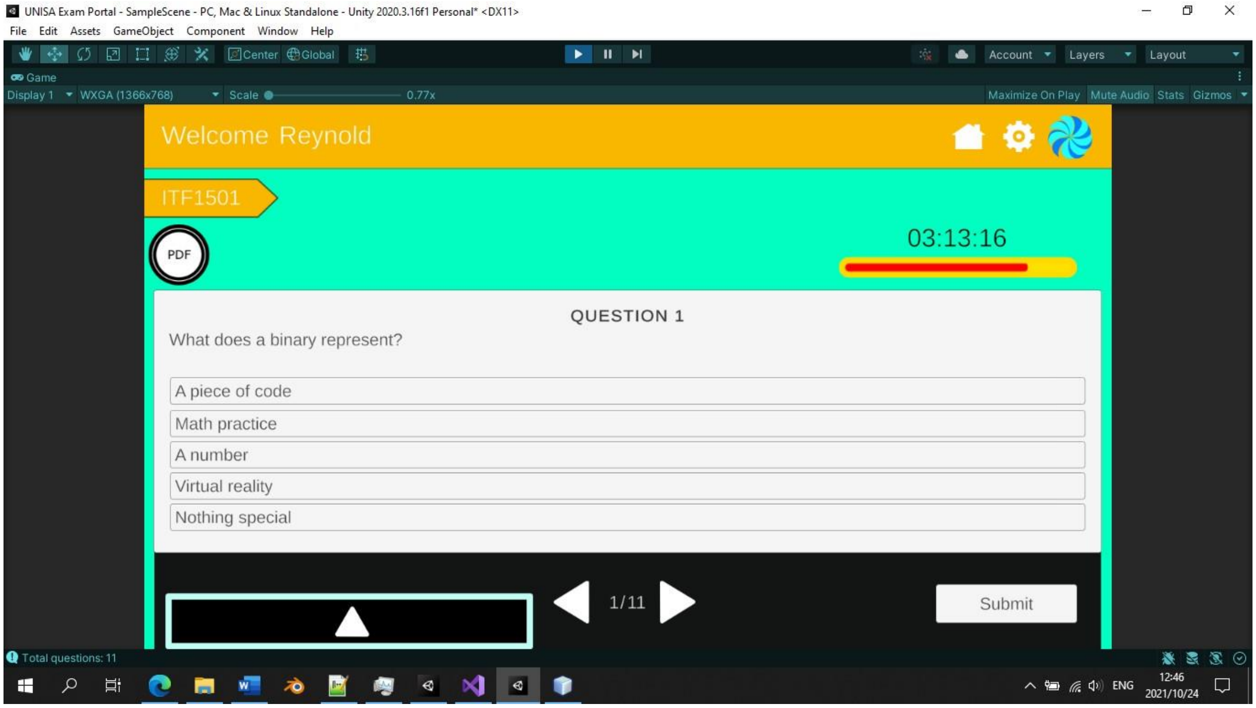
Write a paragraph explaining the ancient techniques used to make wine

Enter text...

Restoration succesfull!

This menu provides the interface for the student to write their fill exam in accordance with the formats and questions set by the lecturer. For image answers, the student clicks on the icon to navigate and select the correct image for upload. Once selected, the icon changes to 'IMG', signifying a filled answer.

Student - MCQ exam menu


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Reynold
ITF1501
PDF
03:13:16
1/11
Submit
Total questions: 11
ENG 12:46 2021/10/24

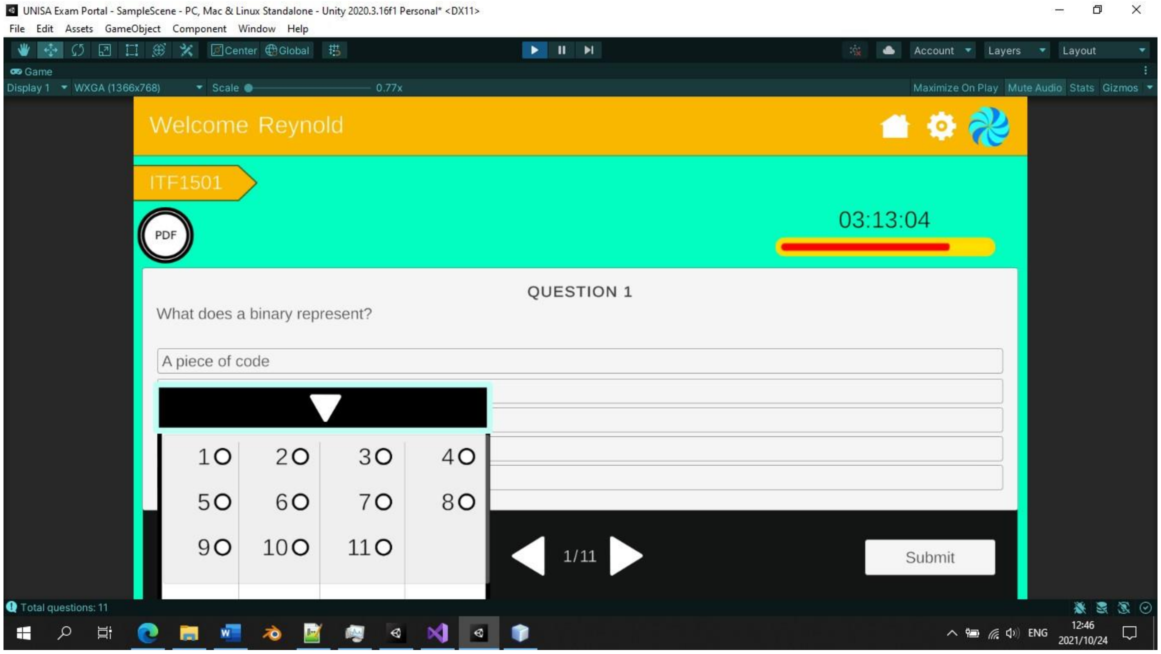
QUESTION 1

What does a binary represent?

- A piece of code
- Math practice
- A number
- Virtual reality
- Nothing special

This menu provides an interface for the MCQ exam. The student picks the correct answer through the options given

Student - Navigate Questions


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Reynold
ITF1501
PDF
03:13:04
1○ 2○ 3○ 4○
5○ 6○ 7○ 8○
9○ 10○ 11○
1/11
Submit
Total questions: 11
ENG 12:46 2021/10/24

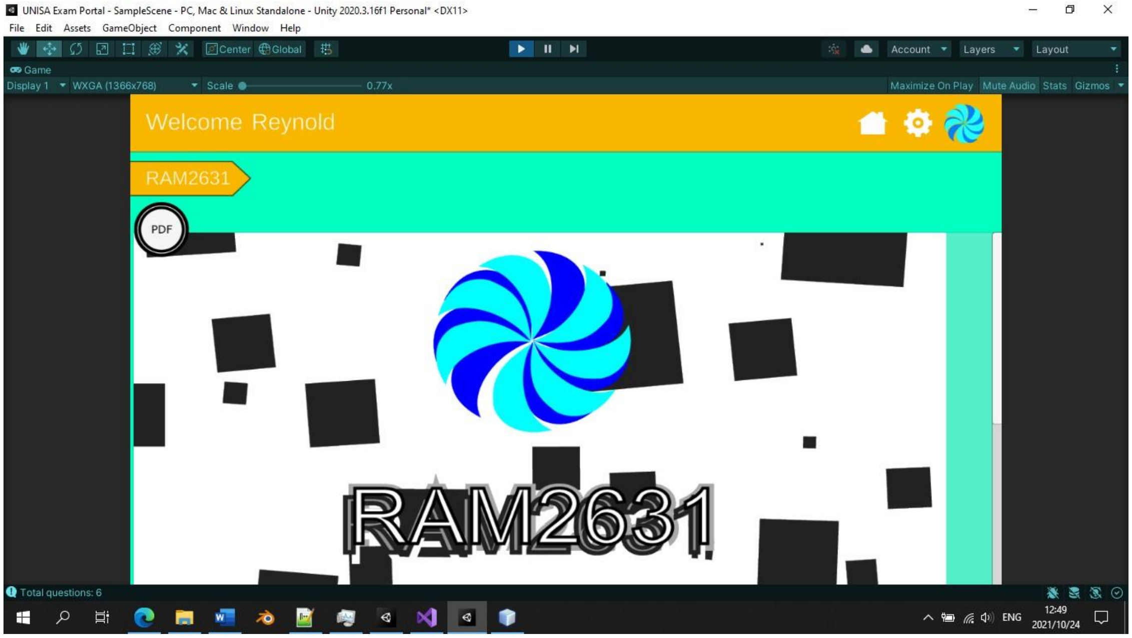
QUESTION 1

What does a binary represent?

A piece of code

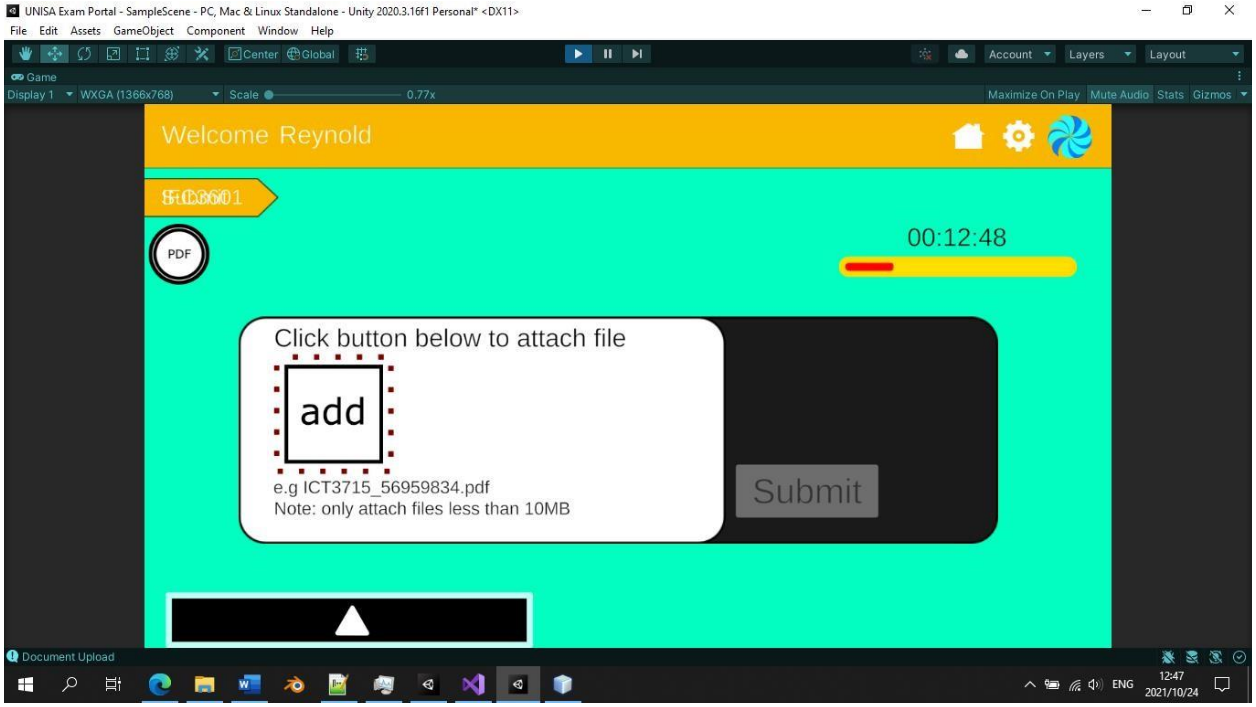
This allows the student to navigate between exam questions when clicked. They can also see the exam questions they skipped and the ones they answered.

Student - PDF Viewer


UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Game
Display 1 WXGA (1366x768) Scale 0.77x
Maximize On Play Mute Audio Stats Gizmos
Welcome Reynold
RAM2631
PDF
RAM2631
Total questions: 6
ENG 12:49 2021/10/24

This is an internal PDF viewer. It allows the student to navigate back and forth between their exam paper without switching out to view the paper on third parties or the browser. This provides convenience and saves time.

Student - Upload exam menu



UNISA Exam Portal - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.16f1 Personal* <DX11>

Welcome Reynold

00:12:48

Click button below to attach file

e.g ICT3715_56959834.pdf

Note: only attach files less than 10MB

This exam menu provides an interface for the student to upload their exam. The user can only upload their exam if the file size is less than 10MB and is in PDF format. The filename gets automatically renamed to fit the JRouter standards.

Reynold Chidziva