Industrial Training (July, 2022) Report
on
Computational Items Data Management Platform

A Project Report submitted in partial fulfillment of the requirements for the award of completion of Industrial Training in the course

Bachelor of Engineering
IN
COMPUTER SCIENCE AND ENGINEERING

Submitted by:

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Under the supervision of faculty

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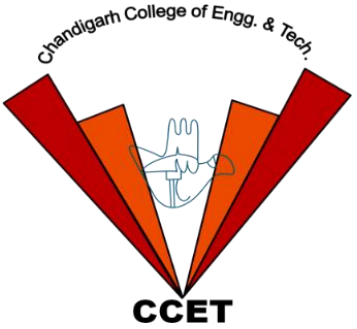

CHANDIGARH COLLEGE OF ENGINEERING AND TECHNOLOGY

(DEGREE WING)

Government Institute under Chandigarh (UT) Administration, Affiliated to Panjab University, Chandigarh Sector-26, Chandigarh. PIN-160019

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CANDIDATE'S DECLARATION

I hereby declare that the work presented in this report entitled "**Computational Items data Management Platform**", in fulfillment of the requirement for the award of the degree Bachelor of Engineering in Computer Science & Engineering, submitted in CSE Department, Chandigarh College of Engineering & Technology (Degree wing) affiliated to Punjab University, Chandigarh, is an authentic record of my/our own work carried out during my degree under the guidance of Dr. Dheerendra Singh. The work reported in this has not been submitted by me for award of any other degree or diploma.

Place: Chandigarh

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CERTIFICATE

This is to certify that the Project work entitled "**Computational Items Data Management Platform**" submitted by **Devashish Gupta,** roll no. **CO20314** in fulfillment for the requirements of the award of Bachelor of Engineering Degree in Computer Science & Engineering at Chandigarh College of Engineering and Technology (Degree Wing), Chandigarh is an authentic work carried out by him/her under my supervision and guidance.
To the best of my knowledge, the matter embodied in the project has not been submitted to any other University / Institute for the award of any Degree.

Dr. Dheerendra Singh
Professor (Dept. of CSE)
CCET (Degree Wing)

Place: Chandigarh

ACKNOWLEDGEMENT

It is a great pleasure and honor to represent this Summer Training Report on "**Computational Items Data Management**". We have taken sincere efforts in this Project. However, it would not have been possible without the invaluable help and support of our mentor Dr. Dheerendra Singh. We are highly indebted to Chandigarh College of Engineering &Technology (Degree Wing) for their guidance and constant supervision as well as for providing all the necessary information. We would like to express our special gratitude and thanks to our mentor for encouraging us to do something different and new and for also addressing our queries throughout the project. We would also like to thank Punjab University for including IPD as a part of our curriculum.

ABSTRACT

A PHP website called Computational Items Data Management Platform manages data regarding computational items, such as printers, laptops, computers, graphic tablets, and other devices, that are assigned to teaching and non-teaching staff and computer laboratories at CCET (Degree Wing). This will make it much simpler to organize the data related to purchasing and transferring such things. decreases the labor required to maintain hard copy registers.

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CHAPTER 1: INTRODUCTION

1.1. Objective

The goal of this website is to build a database for the CCET personnel so they won't have to handle the job of preserving physical copies of computational goods that are in use and stock. This webpage lists the many objects used by CCET (Degree Wing) and the individuals to whom they are assigned. The items consist of:

- Printer
- Laptop
- Computer
- UPS
- Graphic Tablet
- Notice Board
- Patch Cod
- Projector Accessories
- Optical Mouse
- Battery
- Extension Board
- Digital Podium
- Pen drives
- GPU
- Projector
- Networking Items
- Network Switch
- WIFI Access Point
- Keyboard
- Projector Mounting Kit
- Power Adapter
- External Hard Disk
- Wireless Keyboard & Mouse

1.2. Introduction to Programming Languages used for this Implementation

To develop this project, a variety of programming languages, methodologies, and tools were applied. They all offered special capabilities and characteristics that made it possible to create a product with clear code and simple to understand. The following list includes some of the languages and technologies used for this project.

1.2.1. HTML (Hypertext Markup Language)

Figure 1: HTML Logo

HTML, commonly referred to as Hypertext Markup Language, is used to create websites and online applications. With the use of styling, online pages may be styled in HTML and displayed in a pleasing way on a web browser. An HTML document comprises several HTML tags, each of which has a unique content.

Features of HTML

- HTML features many formatting tags, which makes it simple to create a powerful presentation.
- Because it uses markup, it offers a versatile approach to construct web pages that include text.
- Using the HTML anchor element, programmers may include links on web pages.
- It is therefore compatible with all desktop operating systems, such as Windows, Linux, Macintosh, etc.
- It makes it simple for programmers to add images, movies, and audio to web sites, boosting their aesthetic appeal and interaction.
- Tags can be typed in either lowercase or uppercase because HTML does not care about case.

1.2.2 CSS (Cascading Style Sheets)

Figure 2: CSS Logo

CSS, or cascading style sheets, is an acronym. It is a language for creating style sheets that specify the appearance and formatting of markup-language documents. The addition of this function improves HTML. The styling of web pages and user interfaces is often done in combination with HTML and CSS. This technology can be used with all XML document formats, not only plain XML, SVG, and XUL documents. User interfaces are created by combining CSS, HTML, and JavaScript in a variety of online and mobile apps.

Why CSS?

- Addresses a key problem: Each web page needed its own set of tags for the font, colour, background style, element alignments, border, and size before CSS was invented. It took a very long time to complete this. For instance, it will take time and money to create a sizable website with updated font and colour information for each page. To solve this problem, CSS was invented. It had been advised by the W3C.

- Saves time: Since external CSS files include the definitions for CSS style, just one file has to be changed to affect the entire website.

- Provide more characteristics: CSS provides more particular capabilities than plain HTML to describe the look and feel of the website.

1.2.3 JavaScript

Figure 3: JavaScript Logo

A lightweight object-oriented programming language called JavaScript (JS) is used by many websites for their scripting. By combining this language with HTML pages, you may employ

a powerful, interpreted programming language to provide dynamic interactivity on websites. JavaScript may be used to build interactive, modern web apps that don't require frequent page refreshes. JS is heavily utilised on conventional websites as part of its interactivity and simplicity.

Features of JavaScript:

- Because all commonly used web browsers come with built-in execution environments, they can all handle JavaScript.
- JavaScript thusly adheres to C's grammatical rules and hierarchical structure.
- Some types are implicitly cast in the weakly typed language known as JavaScript (independently of the operation).
- It is lightweight and may also be interpreted.
- When writing, it's crucial to utilize the proper case.
- JavaScript may be run on a variety of operating systems in addition to Windows and macOS.

1.2.4 PHP

Figure 4: PHP Logo

With PHP, web building is easy. As a result, it is used to make web applications. PHP was created in 1994 by Rasmus Lerdorf, although it wasn't released until 1995. It uses the 7.2.34 version.

Why PHP?

PHP utilises the MySQL database to build dynamic web applications.

- In addition to overseeing the website's database, it also keeps an eye on session data and dynamic content.
- PHP has a session management feature.
- It has the ability to access and set cookies.
- Data encryption and validation are advantageous.

- We can restrict which pages a user may access on your website using PHP programming.
- Users may fill out forms, store their information to a database, and access useful resources using PHP.

PHP Features:

- A PHP script executes far more quickly than a script created in another language, such JSP or ASP. As PHP makes use of its own memory, the server's load time and memory demand automatically decrease, improving speed and enabling quicker processing rates.
- PHP software and source code are freely accessible online. Any PHP version may be modified to fit your needs without cost. • PHP has a relatively basic syntax and all of its components are free to download and use. Programmers can easily utilise the language.
- It is simple to integrate PHP code in HTML scripts and elements.
- The Windows, Mac, Linux, and UNIX operating systems are all compatible with the PHP programming language.
- Among the well-known databases that PHP supports are MySQL, SQLite, and ODBC.
- PHP allows variables to be used without specifying their datatype. Based on its type and value, it will be taken automatically during execution.
- Almost every local server now in use, including Netscape, Apache, Microsoft IIS, and many more, is compatible with PHP.
- Creating websites using PHP is a secure procedure. It contains several degrees of security to stop malicious attacks and threads.

1.2.5 SQL

Figure 5: SQL Logo

Structured query language, often known as See-Quell, is a term used to describe this type of language. This database language is used to maintain data in relational databases. Additionally,

it may be used to the RDSMS's stream processing capabilities. It is simple to build and modify databases, access table rows and columns, and update the database itself. Both ANSI and ISO approved this query language as a standard in 1986 and 1987, respectively.

Why SQL?

- SQL gives users and data professionals the power to add, amend, and remove data from relational databases.
- In addition to allowing users to access data from relational databases, SQL also enables users to describe structured data.
- It also makes it easier to describe the structured data.
- By enabling SQL users to build, delete, and modify databases and tables, it makes it easier to develop views, stored procedures, and functions in relational databases.
- The relational database can be defined and edited as needed.
- Table fields, views, and stored procedures can also be restricted and permissioned by SQL users.

Some SQL commands

- CREATE
- UPDATE
- DELETE
- SELECT
- DROP
- INSERT

1.3 Tools and Technologies:

1.3.1 Apache Webserver

Figure 6: Apache Webserver Logo

According to estimates, Apache, a free and open-source web server software, powers around

40% of all websites in use today. Its official name is Apache HTTP Server. The Apache Software Foundation is responsible for developing and supporting this software. For website operators, Apache makes it easier to distribute content on the Internet. It is regarded as a web server because of this. One of the oldest and most dependable web servers accessible, the Apache web server was first made available in 1995. When a visitor wants to view a website, they type its domain name into the browser's address bar. It is the duty of the web server to function as a virtual courier and deliver the required files.

Pros:

- Stable and dependable software.
- Despite its free and open-source nature, the software can also be used commercially.
- Updates are made regularly to address security vulnerabilities.
- User-friendly and simple to configure.
- Due to its module-based architecture, it has a high degree of adaptability.
- Cross-platform (implementations on Windows servers as well as Unix)

Cons:

- A number of configuration choices can lead to security vulnerabilities;
- A range of performance concerns have been documented on websites with exceptionally high visitor counts.

Version used: 2.4.53 (included in the lamp stack)

1.3.2 MariaDB

Figure 7: MariaDB Logo

Based on the MySQL relational database management system, the MariaDB database management system is a community effort. technology that is open-source and built on relational databases. It is a fantastic substitute for MySQL. The original MySQL developers created MariaDB as a result of Oracle purchasing MySQL.

Relational database management system called MariaDB. It arranges information into tables. Foreign keys and primary keys are required to bind these tables together.

Version Used: 10.2.38

1.3.3 LAMP

Figure 8: LAMP logo

Our EC2 instance (virtual machine) has the LAMP server installed in order to host our website. The letters L (Linux), A (Apache), M (MySQL or MariaDB), and P make up the acronym LAMP (PHP, Perl, or Python). This software package contains a number of open-source online solutions, such as the Apache server, MariaDB, PHP, and Perl modules, as well as command-line executables for various servers.

Advantages of LAMP

- The LAMP stack's four elements are all instances of free and open-source software (FOSS). Many people who want to develop their websites without having to spend a lot of money on them are drawn to the fact that they are free and may be downloaded.
- In addition, because it is a free and open-source project, other users can modify and enhance the software's source code, enhancing the software's overall capabilities.
- The LAMP stack has established itself as a dependable and secure platform as a consequence of the large community that works to address any issues that may develop.
- The stack may be quickly modified to suit the needs of the company, and the components are interchangeable with other open-source software.

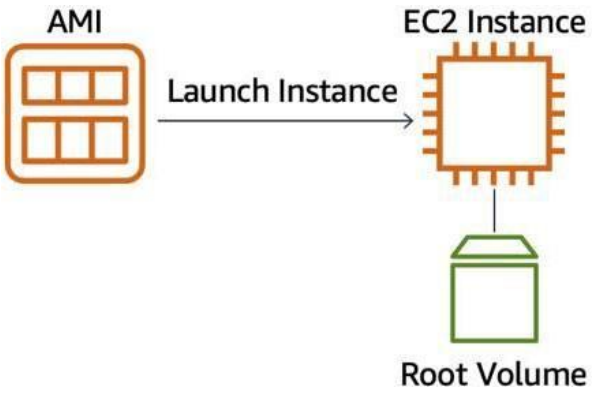
1.3.4 AWS EC2

Figure 9: AWS EC2 Logo

Our website is hosted on AWS EC2. A online service called Amazon EC2 offers safe, scalable computational capability in the cloud. It enables you to set up so-called EC2 instances, which are virtual servers. Although AWS refers to it as a "web service," this does not imply that you may just operate web servers on your EC2 instances. It is possible to create and manage these instances with the AWS Management Console, the AWS Command Line Interface (CLI), the AWS Software Development Kits (SDKs), automation tools, and infrastructure orchestration services provided by AWS. You must declare the following in order to establish an EC2 instance:

- Hardware requirements, such as those for the CPU, RAM, network, and storage.
- Logical configurations, such as the operating system you choose, firewall rules, networking location, and authentication.

By selecting an Amazon Machine Image (AMI), the first thing you configure when you launch an EC2 instance is the operating system you want to run on it.



CHAPTER 2: COURSEWORK AND LEARNINGS

During the period of my summer training, I took several courses to learn different technologies and languages which in some way or the other helped me for the completion of this project. A few of those courses are listed below:

2.1 HTML, CSS, and JavaScript for Web Developers:

This course was offered by Johns Hopkins University at Coursera's platform. It has a total of 5 modules which were spread across a time period of 1 month (5 weeks) and over the course of this timeline I learnt the following things:

1. **Module 1:**

   In this module, I mastered the fundamentals of HTML5. A review of the fundamentals of HTML5, including the purpose of HTML5 semantic tags, which elements can be nested inside of others and which cannot, a rundown of key HTML5 tags, and instructional videos on setting up the development environment follow.

2. **Module 2:**

   CSS is played with a lot by individuals. In this section, I learned the fundamentals of CSS3 before learning more complex concepts like floating and CSS rule conflict resolution. discussions about the "box model," the backdrop property, and other topics. Using our own CSS code to wrap the module, I also learned about responsive design and was introduced to Twitter Bootstrap and its essential Grid System.

3. **Module 3:**

   Are you prepared for REAL fun? It's in this module! In this module I went through the fundamentals of working with clients while overseeing a web project before visiting a real client at their place of business (a Chinese restaurant), where I was supposedly assisted by the owner in determining what she wants in a site and get to know the establishment as a whole. I got to sit next to the instructor (virtually) and observe as we create an actual web site from scratch for this company over the course of the remaining module.

4. **Module 4:**

   What fun would that be if a website didn't work? This module concentrated primarily on the fundamentals of JavaScript. Even seasoned programmers frequently experiment with JavaScript without fully understanding how it works. As a result, it becomes much simpler

to view language as a burden rather than a useful tool. This module was centered around both the "how" and the "why" to engage you with the JavaScript language includes instead of mistake you for them. This module covered everything, from basic language constructions and JavaScript types to objects, functions, arrays, closures, and scope separation.

5. **Module 5:**

I learned how to apply our newly acquired knowledge of the JavaScript programming language to the context of a web page in this lesson. In the beginning, the JavaScript Document Object Model API was used to instruct how to modify the elements of the web page in an appropriate manner. After that, I found out about Ajax, which is one of the most common ways to send data to a website. It explained how to set up and manage Ajax requests and responses, how to work with JSON data, and the HTTP protocol, which is the web's language. In order to dynamically receive the data for the restaurant menu from the server without having to reload the entire page, I connected the restaurant website from Module 3 to a genuine backend service in the final phase of the module.

2.1.1 Course Certificate

2.2 Front-End Web UI Frameworks and Tools: Bootstrap 4

This course was offered by The Hong Kong University of Science and Technology at Coursera's platform. It has a total of 4 modules which were spread across a time period of 1 month (4 weeks) and over the course of this timeline I learnt the following things:

1. **Module 1:**

   I learnt about full-stack web development and the course plan in this module. As I build up a web project using Bootstrap, I understood the fundamentals of Bootstrap. I gained knowledge of the Bootstrap grid system and responsive design.

   Learning Objectives:

   - Explain the meaning of "full stack" with regard to web development.
   - Make a project that supports Bootstrap.
   - The Bootstrap grid system may be used to create a responsive website.
   - Create a website that can adjust to various screen sizes and resolutions automatically.

2. **Module 2:**

   The components of Bootstrap that were created using only CSS classes are the focus of this module. I discovered what navigation and the navigation bar are. Afterwards, I also discovered more about buttons, forms, tables, cards, photos, and media, as well as tags, alerts, and progress bars.

   Learning objectives:

   - Explain why navigation is necessary for your website.
   - Include navigational tools on your website.
   - Utilize tables and cards to create data presentations.
   - Prepare any media that will be used on your website.
   - Create forms and buttons on your website to allow for user interaction.

3. **Module 3:**

   The JavaScript-based components of Bootstrap are the focus of this module. The topics covered include tooltips, popovers, modals, the carousel, collapse, accordion, and tabbed navigation.

   Learning objectives:

   - Recognize how JavaScript elements provide your website dynamic behavior.
   - Use Tabs and Accordion to create a variety of navigational components for your

website.

- Make content-revealing modals, tooltips, and popovers for your website.
- To display dynamic material on your website, create a carousel.

4. Module 4:

The talks on the JavaScript components of Bootstrap are concluded in this module. Then discussion about Less and Sass, two CSS preprocessors was done. The creation and deployment of our Web applications utilizing task automation using NPM scripts and task runners like Grunt and Gulp are the final topics covered.

Learning objectives:

- Using jQuery and JavaScript, create Bootstrap JS component controls.
- Utilize preprocessors like Less and Sass to create CSS.
- Utilizing NPM Scripts, create task automation
- Utilize task runners like Grunt and Gulp to provide automation for tasks.

2.2.1 Course Certificate:

2.3 Cloud Computing and Amazon Web Services (AWS) Fundamentals

AWS Foundations, Service Models, Deployment Models, and Key Principles of Cloud Computing were the main topics of this course.

It has never been more important to gain a solid understanding of cloud computing, regardless of whether you work as a systems administrator, network administrator, or full-stack developer.

Before delving into the theoretical underpinnings of cloud computing, this course provides an overview of the phenomenon. The significant shift from traditional on-premises IT to rapidly expanding cloud migration is the topic of this article. Students will gain an understanding of the fundamentals and benefits of cloud computing by looking at it through the eyes of companies like Netflix and Twitter. Over the past ten years, these and a number of other Fortune 500 companies have aimed to use the cloud to unleash its powerful capabilities. By the end of 2021, cloud data centers will handle 94% of all IT workloads, according to statistics. Additionally, it is anticipated that businesses will spend nearly $400 billion annually on cloud services by 2022.

The course delves into the properties of cloud computing when students have a firm understanding of use cases and cloud terminology, then introduces the idea of virtualization. Students learn how software may be utilized to deploy virtual machines and scalable cloud resources by creating an abstraction layer over computer hardware.

The modules also provide a comprehensive overview of cloud computing service models like Software as a Service (SaaS), Platform as a Service (IaaS), and Infrastructure as a Service (IaaS) to demonstrate the numerous ways that cloud computing is utilized in projects ranging from small to large corporations. Additionally, the course investigates a number of cloud deployment models, including:

- Private cloud
- Community cloud
- Public vs. Hybrid Cloud
- Virtual Private Cloud (VPC)

We examine how AWS became the undisputed monarch of cloud computing services as students get more familiar with the key components of cloud computing. Students will study

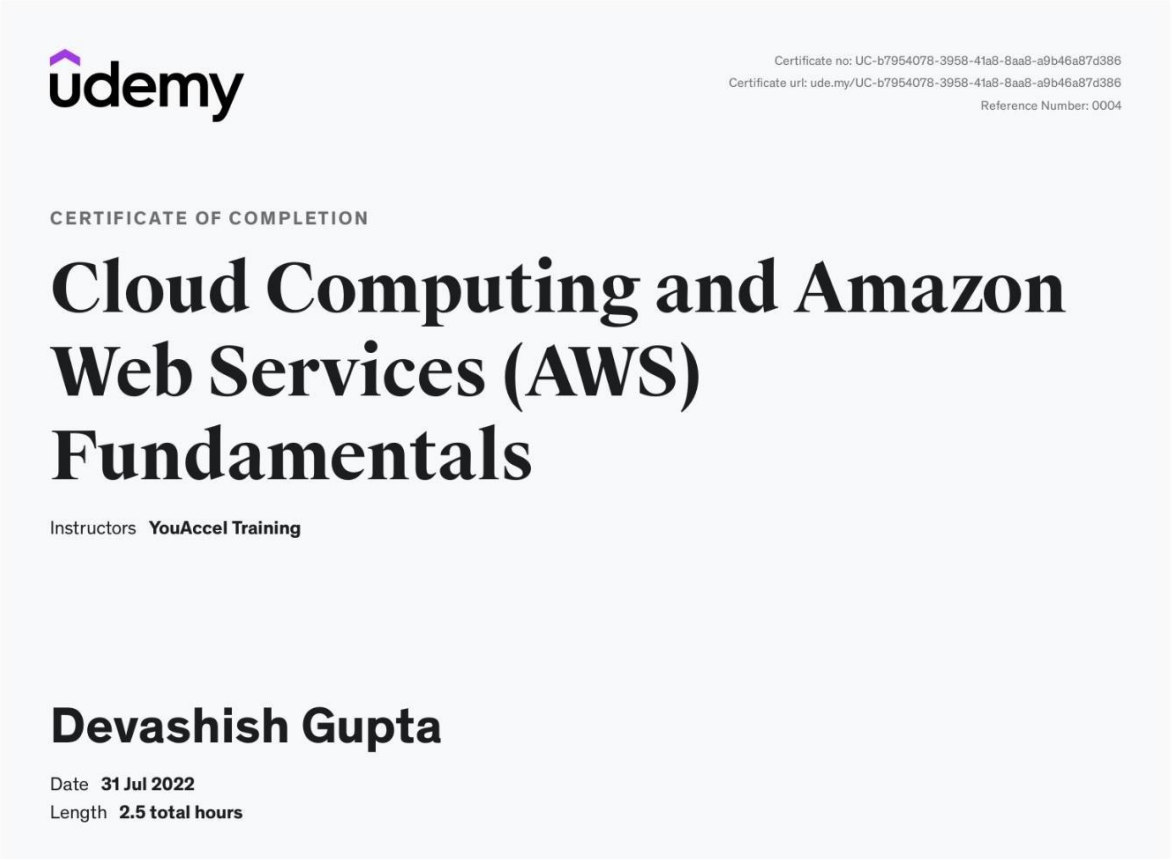
the background of AWS before being exposed to a variety of convincing facts that highlight the value of pursuing a career path that focuses on the AWS platform.

The course's last session provides a practical walkthrough for creating an AWS account as well as an introduction to the fundamentals of AWS accounts. Investigating the following subjects is part of this:

- AWS Global vs. Regional services
- Creating AWS Billing alerts
- Enabling Multi-Factor authentication for account security
- Creating IAM Users and Groups
- Configuring a custom password policy for the AWS account

This course is a great place to start if you're passionate about cloud computing or imagine yourself working as a cloud practitioner. By the conclusion, you will have learned important lessons that are essential to your trip across this enormous, always changing environment.

2.3.1 Course Certificate:



2.4 Amazon Elastic Compute Cloud (EC2) Beginners Certification

The main aim of the course is to teach to Setup, Configure, and Administer EC2 Instances on AWS. Explore Virtualization, Scaling, Elastic IPs, etc.

An extensive overview of Amazon Elastic Compute Cloud is provided in this course (EC2). An essential component of becoming an AWS certified cloud practitioner is the EC2 service. We will begin by going over some of the most important EC2-related ideas, and then we'll go on to a hands-on practical tutorial for establishing computing resources on AWS.

Amazon Web Services and "Scalable Cloud Computing" are frequently used interchangeably. Some of the most well-known websites and apps in the world have been running on AWS for almost ten years. Considered to be the computing core of AWS is Amazon EC2.

The terms "Scalable Cloud Computing" and "Amazon Web Services" are commonly used interchangeably. AWS has been powering some of the most well-known websites and applications in the world for nearly 10 years. Amazon EC2 is said to be the computational hub of AWS.

To demonstrate how Amazon EC2 works, we investigate the concept of virtualization. Virtualization is the process of using software to create a server's virtual representation. When we install an EC2 instance, we create a virtual representation of the server and its resources. This includes CPU, RAM, and storage in addition to other network resources like bandwidth.

Virtual EC2 instances can have many settings, much like actual servers that you would find on-premises. In actuality, AWS provides the broadest range of configuration choices for the deployment of virtual servers. These settings are simple to adjust in real time to our resource requirements.

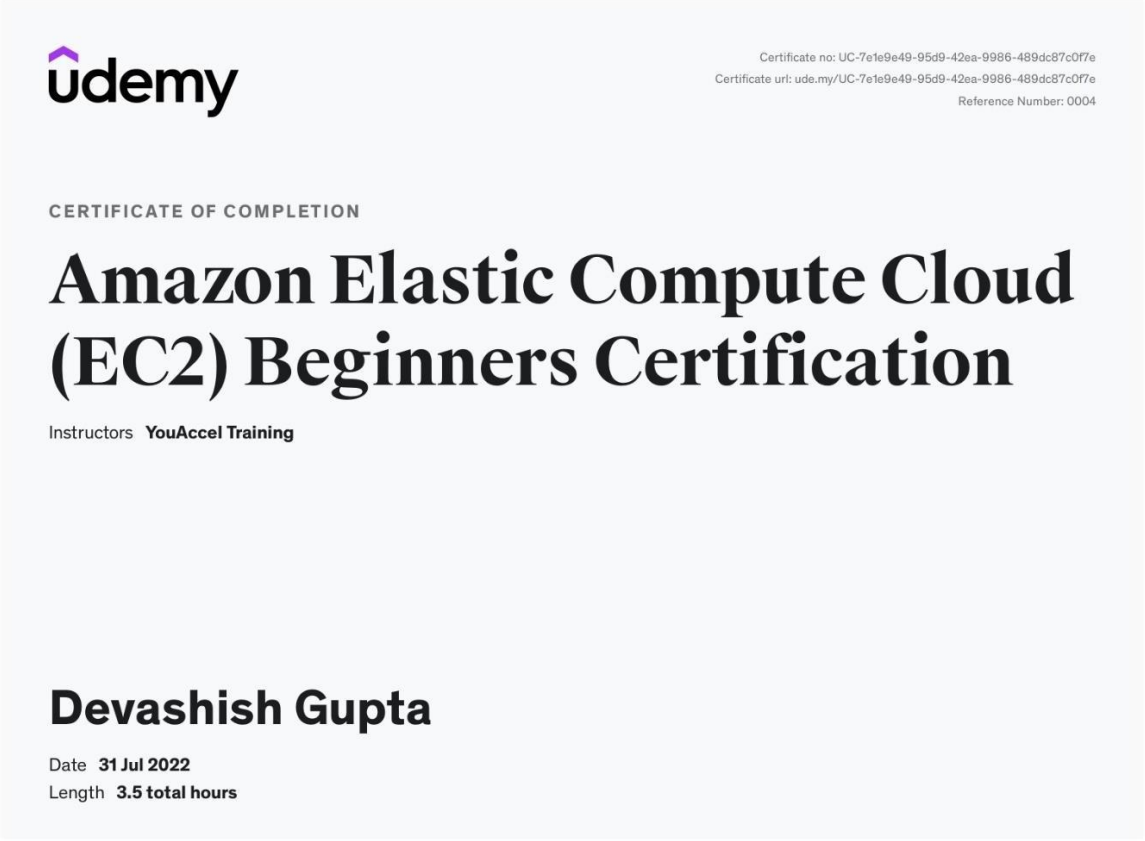
The extent of customization that a cloud service provider can support will determine how sophisticated its overall offering is. Cloud services are not all created equal. When compared to almost any other service, AWS is renowned for having the most configuration choices. The AWS platform uses one of the most scalable and cutting-edge virtualization infrastructures to serve both micro and corporate level clients.

Virtualization allows for the deployment of any operating system on the virtual machine in addition to the customization and scalability of the actual hardware. As you can see, utilizing a range of pre-configured virtual applications referred to as AMIs, we have the freedom to install both Linux and Windows servers (Amazon Machine Images).

This course will provide you both a theoretical deep dive into Amazon EC2 and practical hands-on experience using the main EC2 capabilities. This comprises:

- Exploring the characteristics of EC2 Instances.
- EC2 Instance Types
- Creating IAM Users for EC2
- Deploying EC2 Instances with pre-configured AMIs
- Assigning Elastic IP's to Deployed Instances
- EC2 Instance Administration
- Creating Security Groups for Deployed Instances
- Remote EC2 Administration using SSH Utilities like Terminal for MAC, and PuTTY for Windows.
- Using EC2 Instance Connect to administer instances.

2.4.1 Course Certification:


udemy

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Reference Number: 0004

CERTIFICATE OF COMPLETION

Amazon Elastic Compute Cloud (EC2) Beginners Certification

Instructors YouAccel Training

Devashish Gupta

Date 31 Jul 2022
Length 3.5 total hours

CHAPTER 3: REQUIREMENTS

3.1. Functional Requirements

- It should list every piece of computing technology the institution has purchased as well as every active faculty member, teaching and non-teaching.
- A computational item's movement from one faculty to another and subsequent return to the institution's repository is handled through an admin portal.
- It should contain details like which faculty is assigned to which item, the item's number, its specifications, its status, and so on.
- All administrative duties have to be delegated to it, and it ought to have a password-protected admin portal.

3.2. Non- Functional Requirements

3.2.1. Safety and Security Requirements

A secure database strategy must be used to protect data. The database method used should offer several possibilities for data manipulation. The database needs to be adaptable, secure, provide a wide variety of data views, execute queries quickly, be highly interactive, utilize standardized language, and keep passwords safely. Only the administrator should have access to the features to add to or remove from the database.

3.2.2. Software Quality Attributes

- Availability: Since our project will be hosted on a server or servers in the cloud, it must always be accessible.
- Accuracy: The system needs to provide accurate information about what has been given to which faculty.
- Maintainability: Accurate item and teacher data should be kept in the system. Any database inconsistencies should be easy to correct.
- Usability: The system should do all feasible to satisfy user requests.

3.3. Hardware Requirements

- Although not required, a more recent web browser version is preferred.
- Using the most recent versions of current web browsers requires at least 1 GB of RAM, while a lot is not required.
- Since it runs on a web browser, no additional disc space is needed; only the space used by the browser is needed.

3.4. Software Requirements

- Operating System: Microsoft Windows 7 or above/ Linux Distributions with updates till or later 2016/ Apple MacOS
- XAMPP software
- PHP version 7 or above
- HTML
- JavaScript
- MySQL Server
- Web Browser: Google Chrome, Brave or later
- AWS Cloud services

3.5 Feasibility Study

The main objective of the feasibility study is to evaluate the planned system's viability while taking into consideration a number of factors. The following factors are taken into account before deciding whether to support the new system.

3.5.1 Economic Feasibility

The suggested approach uses less paper in registers and labor to maintain it since digitalized data consumption, namely computational data in database servers, has made data consumption more prevalent. Additionally, manual effort is reduced to laboriously verifying and going through a number of registers, as opposed to just entering data into the system and letting it handle the rest of the process. The services offered by cloud servers can be acquired from a variety of vendors, such as AWS, Azure, Google Cloud, and others, and are fairly reasonably priced. As a result, this strategy is sensible from an economic perspective.

3.5.2 Technical feasibility

Taking into account all the factors, modern institutions automate the boring and repetitive duties that were formerly performed by human staff. The existing system's main operating components are well-suited to automation, proving without a doubt its technological feasibility.

3.5.3 Operational Feasibility

The current system automates the bulk of manual operations. The recommended approach will thereby increase the institution's operational effectiveness as well as that of the administrators and professors (both teaching and non-teaching).

CHAPTER 4: PROJECT ANALYSIS

4.1. Existing Method

Nowadays, institutions process most computational data manually and store it in registers. There are a number of difficulties that instructors, HODs of different departments, non-teaching workers, etc. have while gathering and keeping computational data. This system increases the risk of human error in addition to slowing down the processing of tasks. Additionally, controlling the backlogs is exceedingly challenging and risky due to the possibility of human error.

4.2. Our proposed method

We provided a technique for digitizing the data using a Structured Query Language (SQL) database. Data is digitalized when it is transformed to a digital format. A physical document can be scanned, data can be manually entered into computer software, or data can be imported from a digital source to do this. The data may be kept, processed, and analyzed by a computer once it has been converted to digital form. Data that has been physically prepared, like a paper document, is typically more difficult to access, trade, and modify than data that has been digitally structured. Using SQL databases, the database had to be converted into digital tables. Then, an interface will be built using HTML, CSS, and JavaScript (JS). The database and any queries are managed using this interface. Several components administer and govern the database. An administrator is in charge of all the devices that can be added. The administrator will also add and dismiss non-teaching staff members and college instructors. The interface enables the display of any computer device and related object owned by both teaching and non-teaching staff members. The administrator will have the ability to add and remove items, assign any item to the staff, and then restock the database with inventory. The academic, personnel, and computational components in the interface can be used to filter the data.

4.3. What we Achieved

The data may be converted to digital form using PDF, and then entered into Microsoft Excel. From the excel files, we generate the SQL tables, to which we subsequently add and remove data. Additionally, an interactive user interface is built, giving the user a simple way to do CRUD activities (Create, Read, Update, and Delete). Modules like adding faculty, adding a device, or adding any other item match the items according to a certain code before displaying them and carrying out additional actions. We also created the database on a cloud platform, which enables users to submit as much information as they like without depleting resources.

Computational power is also optimized using the cloud platform.

4.4. Future Prospects

- Digitalizing data has a lot of potential future possibilities. As more businesses and people use digital technologies, the need for digitalized data will only grow. Data digitization might have a number of benefits, including:
- Greater efficiency: Businesses may save time and improve overall efficiency since digitalized data can be accessed and processed much more quickly than physical data.
- Greater accuracy: Compared to manually entered or transcribed data, digital data is less likely to include errors and omissions.
- Enhanced security: Because digitalized data can be stored and sent securely, there is less risk of data loss or theft.
- Greater accessibility: People may cooperate and exchange information more readily since digitalized data is accessible from any location with an internet connection.
- Better insights: As data becomes more digitalized, it becomes simpler to analyse and extract insights that might facilitate better decision-making and propel business success.

More automation, analytics, and integration features are predicted for digitalized data platforms in the future. The following sectors are expected to see growth and innovation in digitalized data platforms:

- Cloud-based platforms: As digitalized data platforms proliferate, they are increasingly made available as cloud-based services, making it simpler for businesses to use them without having to make infrastructure investments on-site.
- Machine learning and artificial intelligence: To help businesses derive more value and insights from their data, more advanced analytics capabilities, such as machine learning and artificial intelligence, are projected to be included into digitalized data platforms.
- Integration with other systems: It is projected that digitalized data platforms would become more integrated with other systems, such as customer relationship management (CRM) and enterprise resource planning (ERP) systems, to provide a more comprehensive picture of business data.
- Greater automation: It's anticipated that digitalized data platforms will have more automation capabilities, such as the capacity to automatically start certain actions based on data inputs.

CHAPTER 5: PROJECT IMPLEMENTATION

5.1 Flowchart

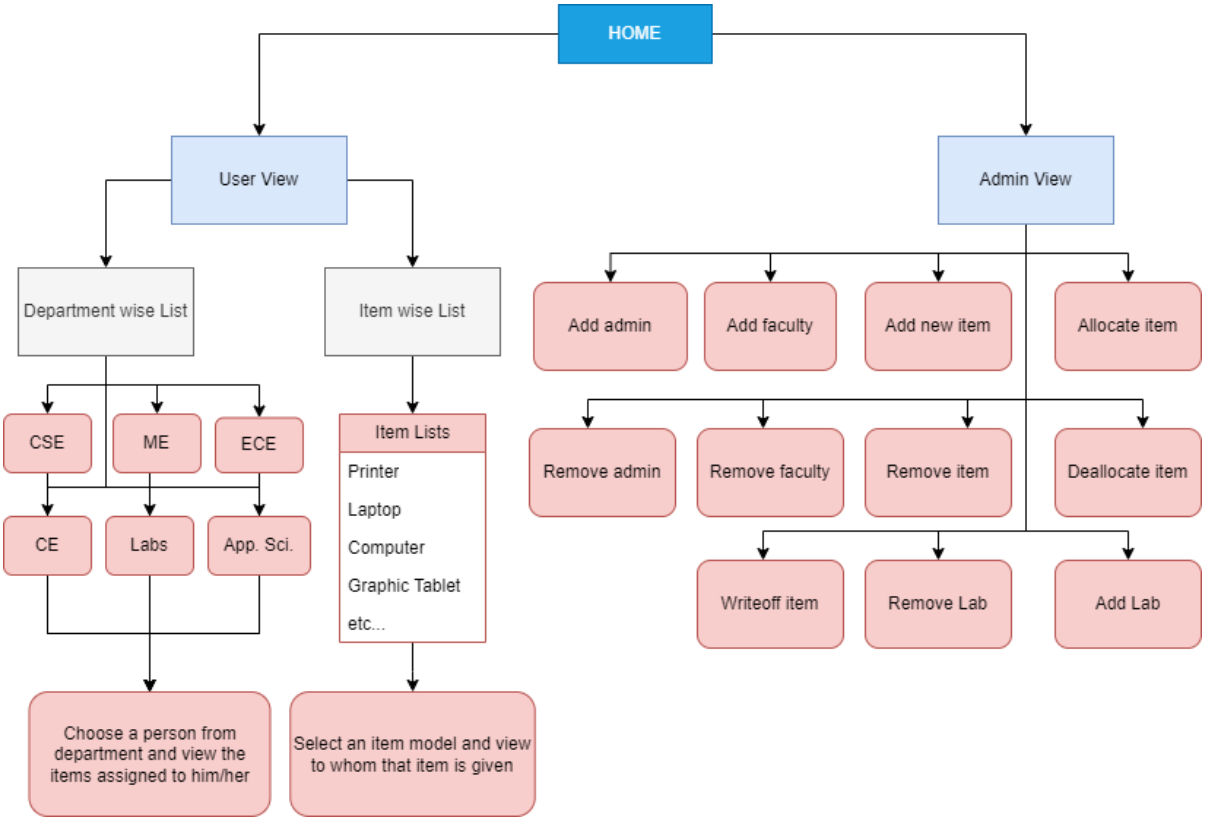


Figure 1

5.2. Modular Description

Home

The homepage of our website is this one. As seen in the graphic below, there are two alternatives on this page:

- The left option allows you to view a list of computational items that have been assigned to staff members by department;
- the right option allows you to view a list of computational items by type, which means you must first select the model to get a list of the staff members or labs that the item has been assigned to. To view the offered list of books, click See All Books.

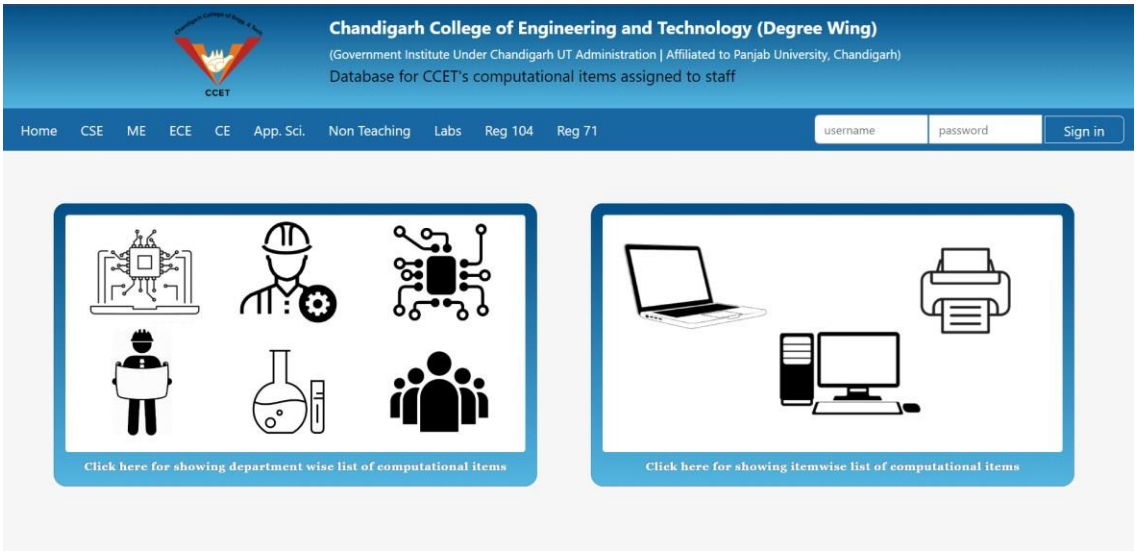


Figure 2

Header

The header as can be seen on the home page has following options:

- Home: The button to return to the home page.
- CSE: Shortcut button to open the list of teaching staff of Computer Science department.
- ME: Button to open the list of teaching staff of Mechanical Engineering department.
- ECE: Button to open the list of teaching staff of Electronics and Communication Engineering department.
- App. Sci.: Button to open the list of teaching staff of Applied Science department.
- Non-teaching: Button to open the list of non-teaching staff of CCET.
- Labs: Button to open the list of all the labs in our college.
- Reg 104: The link to pdf file of stock register no. 104.
- Reg 71: The link to pdf file of stock register no. 71.
- Admin login: The username & password fields and sign in button are also provided at the right-hand side of header to access the admin features (add/remove data from the database).

5.3. PDF Viewer

Being a group project of 6 people, we divided the work into different modules and features among ourselves. I was assigned the task of developing the PDF Viewer with the objective to display the original registers on our website.

The objective of this section is to simply provide the root source of the complete data used in the website. This can help in checking for any redundant data and errors in it, and also acts as a store for original data in case of any discrepancy.

In order to execute this task, I created a basic layout using HTML and CSS and used several JavaScript libraries for implementation of the main functionality of the PDF Viewer.

The basic boilerplate of the HTML is made as follow:

```
<!DOCTYPE html>
<html>
<head>

   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <script src="js/jquery.js"></script>
   <script src="js/jquery-ui.min.js"></script>

   <link rel="stylesheet" type="text/css" href="css/flipbook.style.css">
   <link rel="stylesheet" type="text/css" href="css/font-awesome.css">

   <script src="js/flipbook.min.js"></script>

   <script type="text/javascript">

      $(document).ready(function () {
         $("#container").flipBook({
            pdfUrl: "pdf/71.pdf",
            textLayer: true
         });

      })
   </script>

</head>

<body>
   <div id="container" />
</body>
</html>
```

5.3.1 JavaScript Frameworks:

Apart from the HTML and CSS, several JavaScript Frameworks and Plugins are used for the whole implementation of the PDF Viewer. A little summarization of these JavaScript libraries has been given below:

5.3.1.1 flipbook.js

Using flipBook.js, you can create inline flipbooks on the internet using Scroll. You can play a sequence of images on demand as a small film with this jQuery plugin.

Installation:

npm install flipbook OR

<script src = “flipbook.min.js”></script>

Usage:

```
<div id='walk-cycle'></div>

  <script>
    flipbook({
      id: 'walk-cycle',
      path: 'frames/walk',
      filename: '%1d',
      extension: 'jpg',
      count: 86,
      speed: 0.5
    });
  </script>
```

Options:

- **id** (required) [String]: The id of the element where the flipbook will be inserted.
- **path** (required) [String]: The relative path the directory where the images are.
- **filename** (required) [String]: The pattern of filename (*%3d* = 3 digits or 001, 002, etc, ex. 'images-%3d').
- **extension** (required) [String]: The type of image file *(png or jpg)*.
- **count** (required) [Number]: Count of images in directory.

- **speed** (optional) [Number 0 to 1]: How fast the scroll advances the frames (0: slow, 1: fast). Defaults to 0.5.
- **cover** (optional) [Boolean]: If the flipbook should go full window height, and center-crop (like CSS's background-size: cover). Defaults to false.
- **loaded** (optional) [Function]: Call-back function when the flipbook has loaded all images and is ready to play through. Defaults to none.
- **gif** (optional) [Boolean]: Autoplay the animation and loop like a gif without scroll interaction.

Events:

- **onPreload:** Event triggered every frame have been loaded
- **onLoad**: Event triggered when all frames have been loaded
- **onFrame:** Event triggered when frames have been drawn on screen.
- **onFinish:** Event triggered when all frames have been played.

Methods:

- **init ():** Start to preload all images.
- **play ():** Start to play an animation. Requires all frames of image has been loaded.
- **pause ():** Pause the animation.
- **stop ():** Stop the animation. CurrentIndex will be reset.
- **setCurrentIndex ():** Set the current index. The status will be changed to 'pause'.

Properties:

- **isReady**: Indicates whether all frames of image have been loaded.
- **Frames**: An array of all frames of image and url.
- **currentIndex**: The index of current frame.

5.3.1.2 jQuery.js

jQuery is a fast, small, and feature-rich JavaScript library. Using an easy-to-use API that works across

multiple browsers, things such as HTML traversal, event handling, animation, and Ajax are much simpler. Millions of JavaScript developers use jQuery because of its versatility and extensibility. In other words, it is a lightweight JavaScript library that encourages you to write less and do more. By wrapping common tasks into methods, jQuery allows you to do them without writing a line of JavaScript code. The jQuery library contains the following features:

- HTML/DOM manipulation
- CSS manipulation
- HTML event methods
- Effects and animations
- AJAX
- Utilities

jQuery is one of the most popular and extendable JavaScript libraries, though there are many others available. Many of the biggest companies on the Web use jQuery, such as:

- Google
- Microsoft
- IBM
- Netflix

5.3.1.3 jQuery UI

Based on the jQuery JavaScript Library, jQuery UI provides a collection of widgets, effects, and user interface interactions. jQuery UI is not only an excellent tool for creating highly interactive web applications, but it can also be used to add a date picker to a form control. jQuery UI is built for designers and developers alike. Each of our plugins is designed to help you get started quickly while also evolving to meet your needs and solving a variety of problems.

Key features of jQuery UI include:

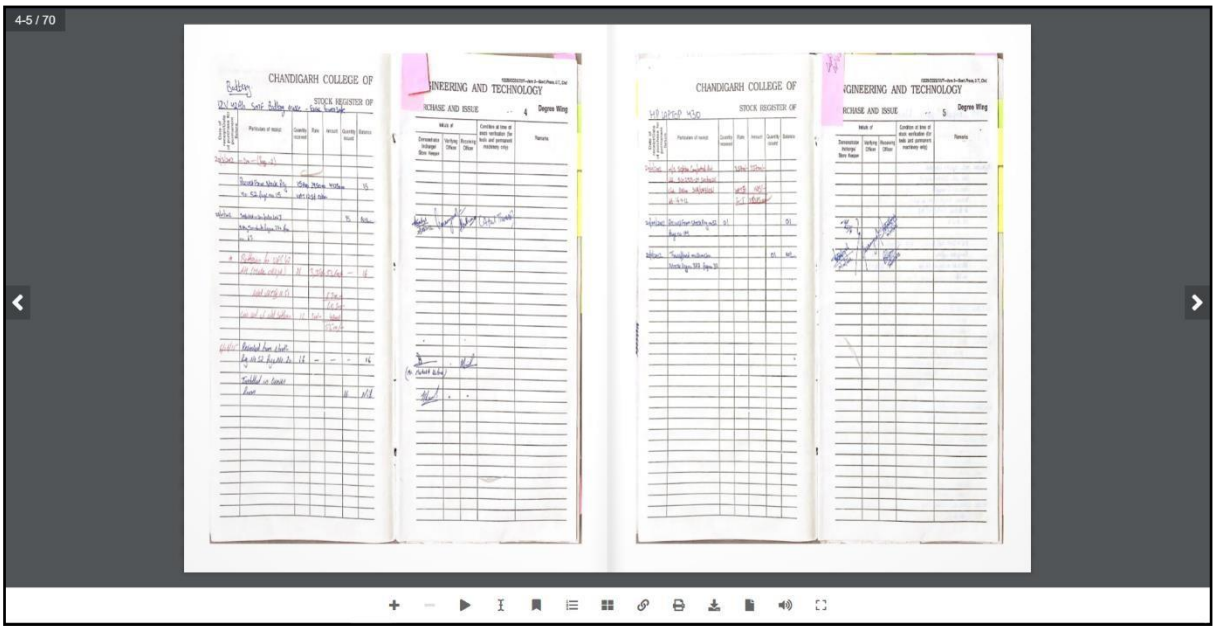
- Good for highly interactive web applications
- Open source and free to use
- Powerful theme mechanism
- Stable and maintenance friendly
- Extensive browser support

jQuery UI plugins have default configurations that are tailored to the most common use cases. With "options", you can override each of a plugin's default settings if you want it to behave differently. As arguments to a jQuery UI widget, options are a set of properties. You can specify whether the slider widget should be horizontal or vertical in the widget's orientation option, for instance.

A very slick application called ThemeRoller is available in jQuery UI for designing your own theme. jQuery UI widgets are designed using ThemeRoller, which provides an interface for designing each element. Your design will be reflected in the widgets on the right as you adjust the "levers" in the left

column. Several pre-designed themes are available under the Gallery tab of ThemeRoller.

5.3.2 Deep dive into the User Interface:



The User Interface for the PDF Viewer is quite simple and easy to use. In the middle of the screen the PDF is shown. On the top left corner, the current page number alongside the total pages of the PDF can be seen. Both left and right edges of the screen have arrows to navigate in between the pages.

The main functionalities/features of the application are present on the bottom toolbar. It has several different components which have been thoroughly explained below:

1. The plus sign (+) can be used to magnify any component or page of the PDF.
2. The minus sign (-) can be used to Zoom out of any part of the PDF.
3. The play button is used to automate the process of flipping over the pages of the PDF. The user can specify the speed of the flipping and can set it according to their needs.
4. The next option is used to select any kind of text which is present in the pdf.
5. The bookmark button as the name suggests can be used to bookmark any no of pages which the user finds important in the pdf itself.
6. The next button can be used to display the table of contents of the pdf. The table of contents also displays the bookmarked pages which were bookmarked using the previous button.
7. The next button is used to display the thumbnails of each and every page on one side of the screen.

8. We can also share the PDF across various social media platforms if it deployed on a public domain using the next button.
9. Apart from all these functions, print functionality is also provided is the user wants to print a page, range of pages, or the entire PDF.
10. We can also download the current page of the pdf using the next button of the toolbar.
11. Not only a single page, we can also download the whole pdf using the button alongside it.
12. The speaker button can be used to toggle “Mute” and “Unmute” functionality as the page flipping comes with a flip sound.
13. The last button on the toolbar is used to toggle full screen mode of the PDF Viewer.

5.4 Database Description

A relational database called "computational database" with 29 tables is used for the project. The database's whole set of tables' schemas is displayed as follows:

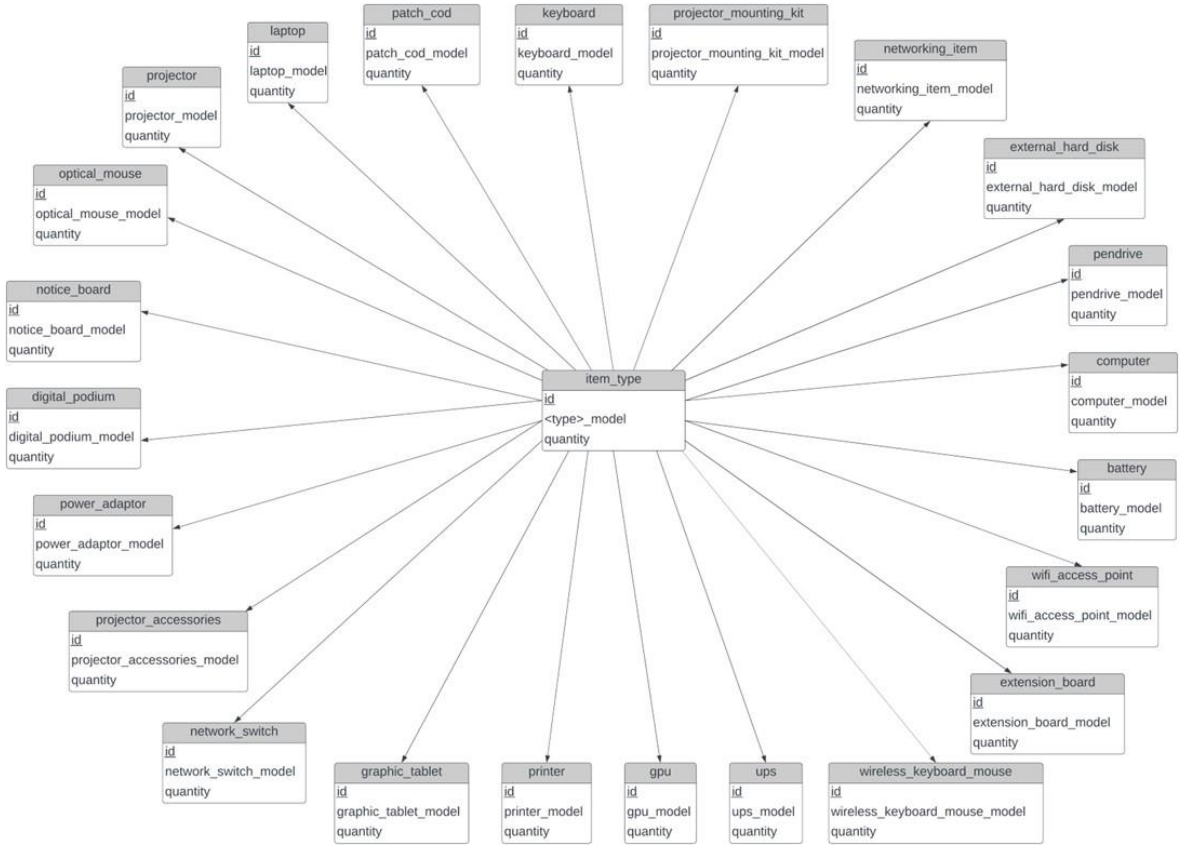


Fig 7. Computational Items in the database

All the units that have been given or allocated one or more computational elements collectively

make up the "lab" entity. There are also hostels, different experimental/practical labs, room numbers, lecture halls, and stock registers.

The diagram has a weak object called "item type." Through the connections "possesses" and "is a," it is dependent on two powerful entity sets, namely faculty and computational items. Figure 6's representation of the ER Diagram The term "item type" refers to any one of the 23 computational item kinds in the database. As a result, it derives its main key as: - "id" (the faculty entity's main key) and a particular "type> model" (representing a "type> model" whose id serves as the computational items entity's primary key). This object represents which of the 23 computational elements each faculty member has as their model. Additionally, it displays how many of this allotted model type there are in its "quantity" column.

CONCLUSION

We have learned a lot from this project on how to develop Android Applications.
This app acts as a virtual bag for its user. It is particularly helpful for computer science students as it provides instant access to some programming books (of java, python, C++, C). This app is also environment friendly as it promotes E-learning and reduces the need for paper production. It helps user overcome the problem of manual book handling.