Spreadsheet

Mayank Parashar[1], Harish Daroch[1], Piyush Malik[1], Pragun Saini[1], Ritik Nagpal[1], Mayank Parashar[2]

[1]UG Student,Computer Science Engineering, HMR Institute of Technology and Management, Guru Gobind Singh Indraprastha University, India
[2]Asst. Prof,Computer Science Engineering, HMR Institute of Technology and Management, Guru Gobind Singh Indraprastha University, India
hdaroch916@gmail.com, piyushmalik1699@gmail.com, ritik.nagpal128@gmail.com, Praguns2122000@gmail.com, mayankparashar5@gmail.com

ABSTRACT

A spreadsheet is a convenient way to keep track of a wide range of data. Financial data, consumer data, and product data are examples of these data kinds. Because of the rapid pace of technology advancement, these applications are always developing. This article offers a fresh viewpoint on the types of applications that can be developed to provide users with a fantastic experience. We designed a web application to solve challenges such as storing various types of data such as financial data, customer data, and product data. For data analysis and documentation, this web application is quite useful and powerful. It is identical to Microsoft Excel in terms of functionality. Using a paper spreadsheet is inconvenient, time-consuming, and limiting. If a piece of your row data changes, you must erase and re-enter it, as well as erase and recalculate any derived data that was affected by your modifications, such as totals or averages. Financial analysis can be done quickly and easily using a spreadsheet. It has the ability to modify both text and numerical data. Budgets, data analysis, and production can all be done with it. We began with an overview of Web Development and its technical properties in this paper. Following that, we gave a basic overview of spreadsheets. In addition, we evaluated previous studies in this sector. We'll also discuss the platforms that are currently being used for similar purposes. We've also gone over the technique we employed during the application's development. This report also makes some recommendations for future work that might be done to improve user service.Web, development, and data analysis are all terms that can be used to describe this project.

Keywords- Web, Development, Data Analysis.

1 Introduction

"Web development" is a term used by Web experts to describe the main non-design parts of constructing Web sites: writing markup and coding. Content management systems (CMS) can be used in web development to make content modifications easier and more accessible to people with only basic technical knowledge.

Web development teams for larger organizations and corporations might number in the hundreds (Web developers) and use common approaches such as Agile methodologies to construct Web sites. Smaller businesses may simply require a single permanent or contract developer, or a secondary assignment to similar professions like graphic designer or information systems technician. Instead than being the domain of a single department, web development might be a joint effort between departments. Front-end developers, back-end developers, and full-stack developers are the three types of Web developers. Front-end developers are in charge of the behavior and aesthetics in the user's browser, whilst back-end developers are in charge of the servers.

Pencil, paper, and calculator have all been replaced by spreadsheets. Spreadsheet tools were originally designed for accountants, but they are today used by anybody who needs to establish a budget, anticipate sales data, make profit and loss accounts, compare financial options, and perform other calculations. The digital version of a general ledger is a spreadsheet.The electronic spreadsheet is organized into columns and rows in the same way as a paper ledger sheet is. Any work that can be done on paper can be done faster and more correctly on an electronic spreadsheet.The problem with manual sheets is that if a data inaccuracy is discovered, all responses must be manually erased and recalculated. Formulas can be written in the electronic spreadsheet that are automatically updated anytime the data changes.

- **Accounting and Calculation Uses**

Spreadsheets are used by businesses all over the world to keep track of their finances. Without the cost of accounting software, you can enter formulas that will perform all of your company calculations as you go. Spreadsheets will perform all of the calculations for you, saving you the time of having to do them manually..

- **Budgeting and Spending Help**

Use a spreadsheet to keep track of your business expenses. You may make your own budget spreadsheets to track your income and expenses so you

don't have any unpleasant surprises when it comes time to submit your taxes.

Assisting with Data Exports

Data that has been exported from other systems can be stored in spreadsheets. Online data management systems sometimes don't show data in an easy-to-read way or make it difficult to retrieve data offline..

Data Sifting and Clean-up

Make use of your spreadsheets to find data inaccuracies and duplicates. It's simple to get rid of unneeded or low-quality data using a spreadsheet. This is especially important when it comes to consumer data, which you must keep current and correct.

Generating Reports and Charts

To report trends or establish business forecasts, use spreadsheets. These reports can be made available to everyone in the firm, and they can use their own time to study the data. Making comparisons between collections of data is simple. You may also use pivot tables to highlight specific parts of your data, which is useful when dealing with large amounts of data.

A spreadsheet's data can be used to make charts, which can subsequently be utilized for reporting. You may construct graphs and pie charts that condense data into an easy-to-read style. It's an excellent tool for business presentations where you need to convey a lot of facts in a short amount of time.

- **Business Administrative Tasks**

Receipts and invoices can be created using spreadsheets. You can also use it to make company forecasts and make long-term plans.
These are some of the most typical uses for spreadsheets, although there are many more ways to use a spreadsheet to fulfill your business objectives.
Configure them to meet your needs, and take advantage of all the ways you can put this simple yet powerful tool to work for you.

Our goal in building this app was to mimic the functionality of Google Sheets while also generating a visually appealing and user-friendly UI/UX for the app. We've also provided data sharing in real time. We've also talked about some of the different development methodologies we've utilized, as well as the reasons for doing so..

Literature Review

A spreadsheet is a graphical user interface tool that consists of multiple worksheets, each with a rectangular grid of cells. Each cell can hold a variety of data, including text, numbers, and formulas, to mention a few. By using references, a cell containing a formula can refer to another cell. In the cell grid, each row and column has a different number and letter. Letters and numbers commonly begin with the letter A. There are two types of references: absolute and relative. An absolute reference, such as B10, refers to a cell with its exact address (tenth row, second column). A relative reference, on the other hand, comprises offsets relative to the contained cell; in cell B10, the relative reference -1, 5 refers to the cell at A15. It's worth noting that the type of a reference has no bearing on the formula's assessment, but it does have an impact on the formula when it's duplicated. References can be shown in a variety of ways. Rows are listed first, followed by columns in the R1C1 format. R2C1 is an absolute reference to the cell in the second row and first column, while R[-1]C[-1] is a relative reference to a cell one row and column above and to the left of the referenced cell. The columns are listed first in the A1 format. Absolute references begin with a dollar sign, although relative references do not. For example, relative to cell B2, A1 refers to the prior column and row, whereas B10 refers to column B and the tenth row. Both formats provide a single reference that includes both absolute and relative rows and columns, as well as cell ranges that refer to a cell area. Finally, Funcalc [19] use the C0R0 format, which is zero-based and indexes with the column first but otherwise resembles the R1C1 format. Because most modern programming languages employ zero-based indices, zero-indexing is a convenient format for array access, hence Funcalc implements it internally.

- **Project Features**

- Formula Evaluation
- Cells Formatting.
- Cycle Detection Formula.
- Realtime Sharing

Platforms

- **Web Application**

A website application, often known as a web app, is a software application program that uses online-based technology to execute specified tasks. Remote web servers host web applications and store data from several connected workstations. You can use a client software to run the online apps and access or enter the necessary data. As we have seen, a web application is not an operating system, hence there is no direct comparison between market shares of web apps and mobile operating systems. Web apps can be run on both desktop computers and mobile devices

- **Reasons for considering Web**

Web applications are simple to set up and use, and they work across all platforms. In fact, a web application eliminates the requirement for individual versions of software to be installed on the computers that utilize them. Because a web app runs in a browser, this is the case. A web application can be accessed from a PC, a Mac, or a mobile device. This gives you a great deal of freedom and power. You will be able to immediately login to your company's data via your mobile phone and any computer with a web browser and an internet connection, anywhere in the globe. Because most of your employees are already experienced with utilizing web-based platforms for other purposes, web applications are also relatively simple to use for them. All updates to the application on the central server are promptly picked up by end users because you don't have to install software on hundreds of computers to allow people to run your program
- Application installation is not required; users access the application on the web.
- Updates and upgrades to newer versions are automatic.
- Any computer with an Internet connection can become an access point to an application, no matter what operating system is installed.
- The risk of viral infection is greatly decreased when running an application on the web

- **Huge Market Share**

As of January 2021, there were 4.66 billion active internet users worldwide - 59.5 percent of the global population.

Global digital population as of January 2021
(in billions)
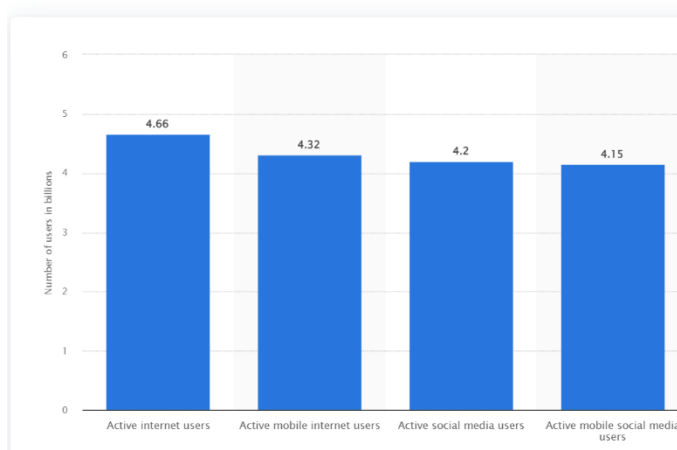
- **Do not need to be downloaded or installed—web apps function in-browser**

  Web apps are not native to a particular system and there is no need to be downloaded or installed.
- **Easy to maintain—they have a common codebase regardless of mobile platform**

  With a wide range of mobile devices and platforms (Apple's iOS, Android, Blackberry and Windows Mobile) opening up, there is an increasing need and rising scope to build Cross Platform Web Applications.
- **Will update themselves**

  Web Application and Desktop Application are on par in respect of updating and maintenance. Depends on platform and scope of the application.

- **Advanced security, authentication protocols and backup**

Identity theft is becoming one of the most common crimes, making security concerns more crucial than ever. A desktop or laptop computer is extremely vulnerable to theft and copying, whereas a web application often employs advanced security and authentication mechanisms to ensure that

data is never accessed for bad purposes. Backup techniques are also extremely beneficial in ensuring that you never lose any important data. If you use a manual paper procedure, you risk losing everything in the event of a natural disaster or other unforeseen incident. Everything can be backed up automatically on a regular basis and transported off site to safe cloud storage with a web application.

- **Do not require app store approval, so can be launched quickly**

Can be launched on the web using the many free resources available. (Costs can be scaled up or down depending on the situation)

Development Methodology

1) **Planning**

- **User Interface implementation**
  Design the basic user interface of the spreadsheet
- **Cell Positioning**
  Organise the cell positions according to the design
- **Cell Mapping**
  Map each cell object with row, column and other values.
- **Formula Evaluation**
  Using Infix Evaluation apply formula implementation in the spreadsheet
- **Sheets Implementation**
  Store values mapped with each cell in a database for every sheet present in the spreadsheet.
- **Enable Realtime sharing**
  Realtime, bi-directional communication between web clients and servers. It has two parts: a client-side library that runs in the browser, and a server-side library for Node.js. Both components have a nearly identical API.

WORK FLOW

User Interface → Cell Positioning → Cell mapping

Formula Evaluation → Sheets Implementation
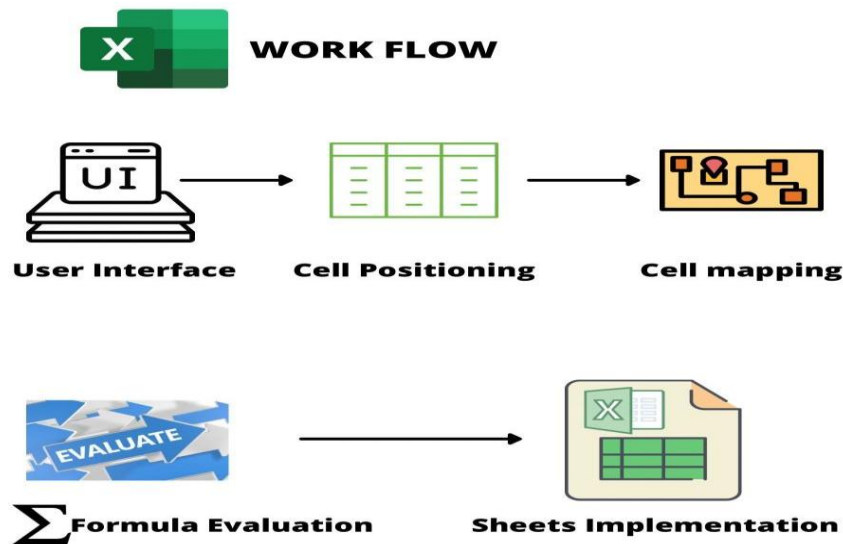
Designing and Coding

We used JavaScript language to write the logic of the application. Reasons for using JavaScript are:

- Speed. Client-side JavaScript is very fast because it can be run immediately within the client-side browser. Unless outside resources are required, JavaScript is unhindered by network calls to a backend server.

- Simplicity. JavaScript is relatively simple to learn and implement.

- Popularity. JavaScript is used everywhere on the web.

- Interoperability. JavaScript plays nicely with other languages and can be used in a huge variety of applications.

● Server Load. Being client-side reduces the demand on the website server.

● Gives the ability to create rich interfaces.

● Semicolons are not necessary in javascript programming. As a result, the programmes are simple to read and comprehend.

While enabling real-time connectivity, we employed Node.js as the runtime engine.Because of its single-threaded nature, Node.js is best suited for non-blocking, event-driven servers. It was created with real-time, push-based architectures in mind and is utilized for standard web sites and back-end API applications.It comes with a plethora of built-in and downloadable libraries that are incredibly handy.The library Socket.io was used to provide real-time communication between the client and the server.The Express Library was used to create a server.

Future Development Recommendation

As technology advances, it is necessary for a company to adapt to emerging tech stacks and strive to provide people with an amazing experience. There are only a few things that need to be improved. Some of these enhancements might include:

1. Users are able to create their own formulas.
2. Adding more preset functions to make things easier to use.
3. Creating charts and providing a visual representation of the data

Conclusion

Spreadsheets are a versatile tool for doing analysis and what-if scenarios. To calculate the various circumstances, you employ formulas in cells with one or more input cells. You can utilize the controls from either the Control toolbox or the Forms toolbar to make working with different values and/or options easier. Your models will be easier to utilize if you use these controls correctly. The controls also make data entering easier while also improving data quality by reducing errors

REFERENCES

[1] "What is Web Development? - Definition from Techopedia". Techopedia.com. Retrieved 2018-12-07.

[2] Campbell, Jennifer (2017). Web Design: Introductory. Cengage Learning. p. 27.

[3] Bureau of Labor Statistics, U.S. Department of Labor. "Information Security Analysts, Web Developers, and Computer Network Architects". Occupational Outlook Handbook, 2012-13 Edition. Retrieved 2013-01-17.

[4] https://www.keenesystems.com/blog/advantages-of-porting-legacy-desktop-applications-to-web-applications

[5] https://ieeexplore.ieee.org/document/495417

[6] https://jssmith1.github.io/assets/pdf/VLHCC17_Spreadsheets.pdf

[7] https://www.researchgate.net/publication/232640593_An_Experimental_Study_of_Spreadsheet_Presentation_and_Error_Detection_PDF

[8] https://www.researchgate.net/publication/321063598_Spreadsheet_practices_and_challenges_in_a_large_multinational_conglomerate

[9] https://uclouvain-cbio.github.io/WSBIM1207/sec-dataorg.html

[10] https://arxiv.org/ftp/arxiv/papers/0803/0803.0159.pdf