MY TEAM PARTY

Project report submitted in partial fulfilment of the requirement for the degree of Bachelor of Technology

in

Computer Science and Engineering

By

Rahul Kriplani (171207)

Under the Guidance

of

Mr. Akshat Mathur

to

Department of Computer Science & Engineering and Information Technology

Jaypee University of Information Technology
Waknaghat, Solan-173234, Himachal Pradesh

Hashedin
by Deloitte

HashedIn Technologies Private Limited
#36/5, Somasundarapalya,
27th Main Road End,Sector 2,
HSR Layout, Bangalore- 560102

TO WHOMSOEVER IT MAY CONCERN

Date: 15 May 2021

Dear Sir / Madam,

This is to inform you that Mr. Rahul Kriplani BE/Btech, 8th Semester Student from Jaypee is currently pursuing his 6 Month internship at Hashedin by Deloitte, Bangalore (Intern ID - IN2021 64) since Feb 2021 to May 2021 and has completed 3 months to date on below project:

Project Title:My Team Party

Mentor Name:Akshat Mathur

Number of working days per week: 5

Mr. Rahul Kriplani is in his training period and is being assessed on intervals. Performance details will be shared pursuant to completion of internship.

Regards,

Suchitra Indukuri

(HR Executive)

HashedIn by Deloitte

#36/5,Somasundarapalya,

27th Main Road End, Sector 2,

HSR Layout, Bangalore-560102

CERTIFICATE

Candidate's Declaration

I decree hereby that the work presented in this report entitled **"My Team Party"** in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Computer Science and Engineering / Information Technology submitted in the department of Computer Science & Engineering and Information Technology, Jaypee University of Information Technology Waknaghat is a real record of our own work carried out over a period from February 2021 to May 2021 under the supervision of Mr. Akshat Mathur(Senior Engineering Management Specialist, Hashedin by Deloitte).

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

(Student Signature)

Rahul Kriplani, 171207

ACKNOWLEDGEMENT

I would like to take this moment to share my sincere appreciation and profound respects to my Agile Coach Mr. Akshat Mathur for his excellent direction, tracking and relentless encouragement over the course of this project. From time to time, the blessing, support and encouragement provided by him will take me a long way on the path of life I am about to embark on. I would like to express my sincere gratitude to our Training and Placement officer**, Mr. Pankaj Kumar** and our Faculty Coordinator, **Dr. Nafis U Khan** for this opportunity.

I would also like to thank **Dr. Ekta Gandotra (Assistant Professor, Senior Grade)** for her constant guidance and support through my academic endeavors at JUIT. She has been a mentor and guide throughout my journey, and I owe a lot to her.

I am also obligated to JUIT College and the staff members for the useful knowledge they provide in their respective fields during the time of our degree coursework. I am thankful for their cooperation.

Finally, I thank the Almighty for his relentless support, my parents and my classmates, without whom this victory would not have been possible.

INDEX

LIST OF ABBREVIATIONS

Acronym	Definitions
ACID	Atomicity, Consistency, Isolation, Durability
API	Application Programming Interface
CI/CD	Continuous Integration Continuous Development
CPU	Central Processing Unit
CRUD	Create, Read, Update, Delete
DRY	Don’t Repeat Yourself
DOM	Document Object Model
ENUM	Enumerators
GAE	Google App Engine
GCP	Google Cloud Platform
HTTP	Hypertext Transfer Protocol
IMDB	Internet Movie Database
IO	Input Output
Js	Javascript
JSON	Javascript Object Notation
MVC	Model View Controller
MVP	Minimum Viable Product
NPM	Node Package Manager
ORM	Object Relational Mapping
PHP	Hypertext Preprocessor
PITR	Point in Time Recovery
REST	Representational State Transfer
SDK	Software Development Kit
SQL	Structured Query Language
SSL	Secure Socket Layer
SVG	Scalable Vector Graphics

Acronym	Definitions
UI	User Interface
URL	Uniform Resource Locator
UUID	Universally Unique Identifier
WAL	Write Ahead Logging
XML	Extensible Markup Language

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

After the pandemic, companies all over the globe had to incorporate a WFH (work-from-home) model and implement it right away. It provided unprecedented challenges not only in terms of productivity and collaboration, but also in ensuring team engagement and maintaining the same level of commitment as would be in an office setup.

My Team Party is an application created with exactly these problems in mind, to pander to a virtual audience and increase team engagement while reducing isolation. It provides helpful recommendations for the team lead to host fun team activities based on analytics gathered from their team members. Want to watch a movie from a genre preferred by most of your team members? Simply let the app suggest a pool for you to choose from!

The app also provides recommendation for upcoming sports events like Football and Basketball so that team members can bond over things other than work, apart from this the app is home to several multiplayer fun games and also helps in intra bonding of team members by finding those of your same passion and hobbies. Shelter your eyes from the bright white screens and enjoy the sleek and smooth dark theme that our app uses.

CHAPTER 01: INTRODUCTION

1.1 Introduction

Employee Engagement is a workplace approach resulting in the right conditions for all members of an organization to give their best each day. Employee Engagement is based on trust, integrity, a two-way commitment and communication between an organization and its members. It is an approach that increases the chances of business success, contributing to organizational and individual performance, productivity and well-being.

From an employer's point of view, employee engagement is concerned with using new measures and initiatives to increase the positive emotional attachment felt and therefore productivity and overall business success. An engaged workforce produces better business results, does not hop jobs and more importantly, is an ambassador of the organization at all points of time.

Engaged employees are perceived to form a part of an organization’s brand and an engaged, happy workforce can have a knock-on effect on customer retention, recruitment of key talent and the ability to attract new customers in a world where a company's values are crucial to the consumers.

The definitions, as seen, focus on the employer as well as the employee. Today’s millennial workforce is more informed, connected, willing to work given learning opportunities. Personal growth, opportunities to learn and explore is becoming a primary driver. Equity more than pay is a driving force. Catering to the changing needs to foster engaged employees is the need of the hour.

As a manager, keeping your employees engaged is perhaps the biggest challenge you face. It is also a huge opportunity to gain long term commitment and discretionary effort from your team. That effort will ultimately lead to higher sales and fewer mistakes.

There is more and more convincing evidence that improving employee engagement can significantly improve the company’s performance across several key areas, such as;

- Profitability
- Productivity

- Customer Satisfaction
- Innovation
- Health and Safety
- Sickness and Absence
- Turnover and Wellbeing

But, to achieve that, your engagement efforts should be aligned with your overall business strategy. Implementing unplanned ideas and activities that you think might help, without monitoring or measuring their impact, is a waste of time and resources.

1.2 Objective

The objective of building an application like My Team Party was to help Team Lead or a Manager to have team engagement and building activities in virtual format as well with the least hassle possible.

Remote teams have fewer opportunities to socialize, making it difficult to get to know one another or new members. This can lead to feelings of isolation and disconnection from our colleagues, and it may even lead to team conflict and reduced productivity.

Virtual team-building exercises can help remote teams to overcome these difficulties, and to drive a sense of community and shared understanding.

The objective of such a platform is to enhance and enforce team engagement because every organization has unique sets of goals and values. Aligning employees with company goals and values gives them a clear perspective of what the company wants to achieve. Employees thus have a better sense of teamwork and are less likely to leave the organization. They remain more engaged since they have a clear picture of how their efforts are going to translate into the growth of the organization. Productive employees give more than they take. They understand business objectives well by actively participating in almost all organizational affairs, working hard on every task, and thus contributes to business outcomes.

With time employees stop bringing their enthusiasm in their workplace. The monotony of their work or unhealthy work culture may often lead to low employee satisfaction and diminish their

passion for work. Even though the reasons can vary from person to person, but the repercussions companies face for employee unproductivity are the same.

The sense of well-being is psychological. And people experience a good sense of well-being when they have better relationships, freedom, personal growth and a sense of purpose and meaning in life.

Employees with a good sense of well-being are not only engaged and satisfied in their jobs but also empower others with their positivity and enthusiasm.

Support your employees and always help them in need. Actively listen to them, communicate more to understand their state of mind, and try to know anything is bothering them or diminishing their well-being.

By workplace conditions, I mean the work environment, internal communication, teamwork, respect, and healthy relationships in the workplace. All these aspects collectively drive productivity and engagement. And therefore, it is critical to improving these aspects.

Conduct employee engagement surveys to get a clear picture and then start working on the area which needs immediate attention. For example, the survey reveals that the employees are not happy about the communication in the organization and often are misinformed, or their opinions and views don't reach the top authorities. In this case, make sure you build a culture or a communication platform that helps address these issues.

When you give your employees an excellent working experience and take care of their needs, it will not only help improve productivity but the overall growth of the organization.

A workplace consists of diverse mindsets, and often, they have their own way of completing their tasks. Therefore, it's a manager’s job to understand this aspect and delegate work to employees according to their core strengths and interests. Give them flexibility if they need it. If someone asks for flexible work hours to balance their work-life, try considering it.

If working around the attitudes of your employees gives you more productivity and employee engagement, then consider it as your best bet.

Employee motivation is one of the most substantial aspects of employee engagement. Motivated employees tend to perform better and are more productive in their jobs. Motivated employees feel a sense of commitment to the organization's goals and objectives. They can lead to increased productivity and allow an organization to achieve higher levels of output. Whereas demotivated employees spent most of the working hours surfing the internet for fun or looking for other job opportunities.

Employee motivation can be increased by positive communication in the workplace and also acknowledging individual contributions and reward them for the same.

Often a negative work environment also diminishes employee motivation. Management can, therefore, conduct surveys to know this aspect better and take immediate action to resolve the issue.

1.3 Motivation

The prime motivation for a virtual team engagement product was due to the reason of seeing the current scenario of work from home due to which several team members have such kind of experience:

	Employee	Team Lead
Persona	Some employees may have recently joined the organization and had a digital onboarding done. They love their work but are disconnected with their team for not having met them in person and having conversations limited to mostly work.	Team Leads and Human Resource in this pandemic must keep the team engaged and connected as everyone is working remotely and the connect within teammates has been limited to work.
Goals	• Enjoy the job and not just the work • Increased efficiency • Collaborate to learn and enjoy	• Keep the team connected • Increase efficiency • Collaborate with team members
Tasks	• Get to know the team • Make work less burdensome • Involve in organization activities to be able to view the workplace beyond just projects	• Need to have small team building activities on regular basis

		• Need to have an interactive and team engagement session
Pain	• Monotonous routine • Disconnect with the peers • Long working hours leading to burnout	• Monotonous routine • Disconnect with the teammates • Need to collaborate with respective stakeholders for organizing a small event
Wow Factors	• Fun activities that can be done together • Replacement for the regular 'chai-time break'	• Fun activities can be organized • One stop for everything needed for E-party

Table 1 User Personas

Seeing the user personas, their goals, tasks, pain points made us to find a wow factor which can be embedded in a product which would help teams to have virtual team engagements in such scenario as well as in future when this norm may be adopted by most of the world.

1.4 Language Used

For the application we did research on several web development tech stacks and then finally decided to go forward with:

- React Typescript for frontend
- Node.js and Express.js for backend
- PostgreSQL for database
- GCP App Engine for deployment

React is a "JavaScript library for building user interfaces", while TypeScript is a "typed superset of JavaScript that compiles to plain JavaScript." By using them together, we essentially build our UIs using a typed version of JavaScript.

The reason we used them together was to get the benefits of a statically typed language (TypeScript) for our UI. This means more safety and fewer bugs shipping to the front end.

The quickest way to start a React/TypeScript app is by using “create-react-app” with the TypeScript template. You can do this by running:

npx create-react-app my-app --template typescript

This will get you the bare minimum to start writing React with TypeScript. A few noticeable differences are:

- *the .tsx file extension*
- *the tsconfig.json*
- *the react-app-env.d.ts*

The tsx is for “TypeScript JSX”.

The tsconfig.json is the TypeScript configuration file, which has some defaults set.

The react-app-env.d.ts references the types of react-scripts and helps with things like allowing for SVG imports.

We went ahead with functional based components because this way we build reusable components with DRY strategy, we just have to import that component wherever it is needed in the project as well as we can also install predeveloped React components and use them without wasting time in reinventing the cycle.

“React itself is quite a unique library in its field. It has an object-oriented approach and builds UI by breaking them into classes and instances, and each component inherits from super classes like other OO languages. It also relies on methodologies used by game engines to update the UI in real-time.”

“React has its own virtual DOM loaded with the current state of the browser DOM. After an interaction, or an update to a component in React, a Diff operation between new state of the object and the one in the virtual DOM is called -similar to that of Git, which checks the shortest path to apply this change, and then patches the browser DOM. This is extremely important because native DOM operations are very slow, while the JavaScript implementation of the DOM used by React is superiorly faster, and this operation should be as efficient as possible.”

“React is very responsive because of this, and its syntax allows for great abstraction in the structure of the code and enables for easier debugging because decoupling is easy. Also, since React allows for a convenient way to control the state completely on the client-side, it can act as a complete MVC model on its own, where the view is compared to the virtual DOM -model- by the controller that is React within functions like ShouldComponentRender.”

“Node JS is a JavaScript platform for building fast, scalable, network applications. Node is single threaded and built around the paradigm of none-blocking IO. With Node.js each incoming request by the user is handled by one single thread in opposition to the multi-threaded techniques used by PHP to scale the operations. Each request handled by this thread is coupled with a callback function that is called upon completion of the task. This is possible due to the fundamental support of JavaScript for events, Asynchronous operations, and callbacks; and Node.js puts JavaScript on the server side.”

Node has several advantages, some of which are:

- RESTful API: “As Node can build an HTTP server out of the box, it can communicate with all other components through HTTP methods for CRUD operations based on the RESTful paradigm.”
- Single Threaded: “Since it is not blocking I/O operations, Node can handle all user requests using a single thread, instead of allocation of new thread for each request, which has a large memory footprint. Nonetheless, Node does use a thread pool at the kernel level to guarantee that the operations are being executed asynchronously without blocking the event-loop. This is necessary because the kernel does not support all operations asynchronously.”
- NPM: “The Node Package Manager is based on JavaScript's npm. A built-in module that supports package management, it can be used to easily download and install modules for a Node application. Moreover, Node already has many packages and libraries developed to work on top of it; all of which confine to the asynchronous nature of Node.js.”
- None-blocking I/O: “Because Node uses an Event-loop to allow asynchronous operations and callback functions, it is capable to setting the requesting function on the side till the task is completed and meanwhile handling other tasks.”
- “There is also an advantage for using JavaScript on the server because data structures and logic may be shared by both front-end and back-end which increases the synergy of the

developers' team as resource may be shared. Furthermore, using a unified data structure across the stack makes transfer easier and removes the overhead of data conversion and casting."

- Finally, Node is supported by a great community that is very vibrant and dedicated to constantly improve Node.js itself or develop new modules for it.

"Nevertheless, Node.js is not problem free and has flaws that sometimes hinder production level websites. The most confusing part with Node.js for a newcomer, is to get adapted to the asynchronous programming. To assure that the single thread Node.js provides does not get delayed, it is necessary to guarantee that no blocking operations occur in the stack so that the thread does not get hanged which would deter the whole performance of the server. Getting used to the Async paradigm is not easy though, and callbacks tend to get nested and hard to trace back."

"There is also the issue of scaling on different CPUs which Node is incapable of performing due to its single thread; it can only run on a single CPU and cannot be scaled on big server pools in contrast to distributed programming possible with other languages. At the same time this limits Node's capabilities. Node tend to perform very well with basic I/O operations which are blazingly fast with callbacks. But, since a single thread is used, all operations [callbacks], will be executed in the stack, on that single thread, which would harm the performance significantly if the task blocks for a relatively long time. This limit's Node capabilities as a full sever and tends to do well only in simple websites like chatrooms and blogs."

"Node.js has faced many problems due to its immaturity at this stage, especially when using modules which are not tested in big production means that there is big margin of error. This may cause in some cases memory leaks that would increase latency and CPU usage, and if it occurs while there are thousands of simultaneous requests, the server tends to crash and must be restarted.

Although Node is capable of independently act as a web server, there are frameworks designed to make it more powerful and efficient -the most popular being Express.js. It is fast, minimal, and has several applications built for it." Express was chosen for several reasons among them are:

- Minimalistic: "Express makes it possible to build an HTTP server very easily by wrapping the backend code of Node.js, and it makes the building of a RESTful API very simple."

- “Express supports middlewares which are functions called in a sequential order on a request or response. For example, a middleware I am using is body parser, which parses the body of incoming HTTP requests with a form submission. This allows me to access the parameters of the request directly. Middlewares can do anything, and they end with next(), which calls the next middleware.”
- “Routes are Express’s way to handle incoming requests on a certain URL. Express after detecting the incoming requests directs it to a specific routing JavaScript file that handles all the logic associated with that URL. This is precisely helpful to keep the code lean and organized.”
- Supports a wide range of available templates engines out of the box.
- “Provides a range of extra helping features such as being able to redirect the user to another URL from within the server.”
- “A good community. Express is one of the original Node web frameworks, the community has developed very comprehensive tutorials, online examples, extensive documentation, and powerful tools for Express.”

“PostgreSQL is a powerful, open source object-relational database system that uses and extends the SQL language combined with many features that safely store and scale the most complicated data workloads. The origins of PostgreSQL date back to 1986 as part of the POSTGRES project at the University of California at Berkeley and has more than 30 years of active development on the core platform.

PostgreSQL has earned a strong reputation for its proven architecture, reliability, data integrity, robust feature set, extensibility, and the dedication of the open source community behind the software to consistently deliver performant and innovative solutions. PostgreSQL runs on all major operating systems, has been ACID-compliant since 2001, it is no surprise that PostgreSQL has become the open source relational database of choice for many people and organizations.”

“PostgreSQL comes with many features aimed to help developers build applications, administrators to protect data integrity and build fault-tolerant environments, and help you manage your data no matter how big or small the dataset. In addition to being free and open source, PostgreSQL is highly extensible. For example, you can define your own data types, build out

custom functions, even write code from different programming languages without recompiling your database!

PostgreSQL tries to conform with the SQL standard where such conformance does not contradict traditional features or could lead to poor architectural decisions. Many of the features required by the SQL standard are supported, though sometimes with slightly differing syntax or function."

Data Types: "All needed data types are supported in PostgreSQL like a Primitives (integer, numeric, string, Boolean, etc.), Structured (date/time, timestamp, interval, array, range, uuid, enum, etc), Documents (JSON, XML, etc), Geometry (point, line, circle, polygon, etc) and Customized Types defined by you."

Data Integrity: "The best needed constraints are supported in PostgreSQL like UNIQUE, NOT NULL, Primary Keys, Foreign Keys and Exclusions. You can use Explicit Locking (full ACID supported), Advisory Locks. Concentrate all your business rules into the databases."

Concurrency and Performance: "Some powerful types of basic/advanced indexing methods like B-tree, Multicolumn, Expressions, Partial, Bloom filters. Take the best of a sophisticated query planner / optimizer. Use index-only scans and multi-column statistics. You can do the best with Transactions, Nested Transactions (via save points), Multi-Version concurrency Control (MVCC), Parallelization of read queries and Declarative Table partitioning."

Reliability, Disaster Recovery: "PostgreSQL have a WAL to provide data assurance. He never loses data by yourself. Replicate your data using Master/Slave Native Replication. The replication can be Asynchronous, Synchronous, Logical (providing Publication/Subscription resources). You can do a PITR or use active standbys. Finally, distribute data between storages using Tablespaces."

Security: Data is always protected by man in the middle attacks. You can use a robust access-control system, in tables, objects, columns and at row-level too.

Extensibility: "Use stored procedures, functions in procedural languages like PL/PGSQL, Perl, Python (and many more). Connect, Read and Write data from other databases or streams with a standard SQL interface using Foreign data wrappers. Use many extensions that provide additional functionality."

Internationalization, Text Search: PostgreSQL have support for international character sets, e.g. through ICU collations. Use native full-text search to find your text data quickly.

Not relational data (JSON): "You can use documents (JSON, XML) native data types to transform PostgreSQL into a NoSQL database. The content of this data types can be indexed, providing a lot of speed and data integrity. Join the best of two worlds (relational and no relational) using an easy SQL syntax to query non-relational (but indexed) data with the best speed."

Building applications on the cloud is gaining traction as it accelerates your business opportunities while ensuring availability, security, accessibility, and scalability. However, to start with creating web applications, you would require a suitable cloud computing technology. This is where Google App Engine fits in by allowing you to build and host web applications on a fully managed serverless platform.

Google App Engine in cloud computing is a PaaS, Platform as a Service model, i.e., it provides a platform for developers to build scalable applications on the Google cloud platform. The best thing about GAE is its ability to manage the built applications in Google's data centers.

This way, organizations only have one job to master — building applications on the cloud. For the rest part — the App Engine provides the platform as well as manages the applications.

Some of the prominent Google App Engine features include:

1. Collection of Development Languages and Tools

The App Engine supports numerous programming languages for developers and offers the flexibility to import libraries and frameworks through docker containers. You can develop and test an app locally using the SDK containing tools for deploying apps. Every language has its SDK and runtime.

Some of the languages offered include — Python, PHP, .NET, Java, Ruby, C#, Go, Node.Js.

2. Fully Managed

Google allows you to add your web application code to the platform while managing the infrastructure for you. The engine ensures that your web apps are secure and running and saves them from malware and threats by enabling the firewall.

3. Pay-as-you-Go

The app engine works on a pay-as-you-go model, i.e., you only pay for what you use. The app engine automatically scales up resources when the application traffic picks up and vice-versa.

4. Effective Diagnostic Services

Cloud Monitoring and Cloud Logging that helps run app scans to identify bugs. The app reporting document helps developers fix bugs on an immediate basis.

5. Traffic Splitting

The app engine automatically routes the incoming traffic to different versions of the apps as a part of A/B testing. You can plan the consecutive increments based on what version of the app works best.

Adopting the App Engine is a smart decision for your organization — it will allow you to innovate and stay valuable. Here the answer to why Google App Engine is a preferable choice for building applications:

Benefits of Google App Engine:

1. All Time Availability

When you develop and deploy your web applications on the cloud, you enable remote access for your applications. Considering the impact of COVID-19 on businesses, Google App Engine is the right choice that lets the developers develop applications remotely, while the cloud service manages the infrastructure needs.

2. Ensure Faster Time to Market

For your web applications to succeed, ensuring faster time to market is imperative as the requirements are likely to change if the launch time is extended. Using Google App Engine is as easy as it can get for developers. The diverse tool repository and other functionalities ensure that the development and testing time gets reduced, which, in turn, ensures faster launch time for MVP and consecutive launches.

3. Easy to Use Platform

The developers only require writing code. With zero configuration and server management, you eliminate all the burden to manage and deploy the code. Google App Engine makes it easy to use the platform, which offers the flexibility to focus on other concurrent web applications and processes. The best part is that GAE automatically handles the traffic increase through patching, provisioning, and monitoring.

4. Diverse Set of APIs

Google App Engine has several built-in APIs and services that allow developers to build robust and feature-rich apps. These features include:

- Access to the application log
- Blobstore, serve large data objects
- Google App Engine Cloud Storage
- SSL Support
- Page Speed Services
- Google Cloud Endpoint, for mobile application

5. Increased Scalability

Scalability is synonymous with growth — an essential factor that assures success and competitive advantage. The good news is that the Google App Engine cloud development platform is automatically scalable. Whenever the traffic to the web application increases, GAE automatically scales up the resources, and vice-versa.

6. Improved Savings

With Google App Engine, you do not have to spend extra on server management of the app. The Google Cloud service is good at handling the backend process.

Also, Google App Engine pricing is flexible as the resources can scale up/down based on the app's usage. The resources automatically scale up/down based on how the app performs in the market, thus ensuring honest pricing in the end.

7. Smart Pricing

The major concern of organizations revolves around how much does Google App Engine cost. For your convenience, Google App Engine has a daily and a monthly billing cycle, i.e.,

Daily: You will be charged daily for the resources you use

Monthly: All the daily charges are calculated and added to the taxes (if applicable) and debited from your payment method

Also, the App Engine has a dedicated billing dashboard, “App Engine Dashboard” to view and manage your account and subsequent billings.

Chapter -02 LITERATURE SURVEY

What is Virtual Work?

Discussions about virtual work environments, which use technology to interact with others across geographic, organizational, and other boundaries, are very common throughout modern workplaces (Martins, Gilson, & Maynard, 2004). The virtual work environment is referred to by a variety of terms, including telecommuting/telework, remote work, and work-from-home (Parris, 2014). Throughout this paper, I use the terms virtual work, telework, and remote work interchangeably because they are all equivalent.

Telecommuting/Telework	A person who works primarily from their home office. There may be some in-office work being done by teleworkers.
Remote Work	Worker lives outside of the geographical area of the company's main headquarters or office.
Work-From-Home (WFH)	Implies that an employee will be working from home.

Table 2 Common Terms Used Interchangeably with Virtual Work

"In the early 1970s the term telecommuting made its debut. Gan (2015) asserts that Jack Niles, a former NASA engineer, proposed telecommuting as an "alternative to transportation" and to describe what he was doing. This was at the height of suburban migration where most office and auxiliary workers commuted daily into central business districts that were often located in more urban city centers (Gan, 2015). The high number of cars entering these areas combined with poor urban planning led to standstill traffic known as "gridlock." To decrease traffic and energy consumption, many companies agreed to have clerical workers report to offices that were closer to their homes. According to Global Workplace (GW), in 2020 virtual work is most common in industries such as: information technology services; professional, scientific, and tech services; and finance and insurance services. Working remotely in these industries requires minimal technological infrastructure (e.g., a computer and internet access for basic tasks). GW also reported that the typical telecommuter is college-educated, 45 years old or older, earns an annual salary of $58,000, and generally works for a company with more than 100 employees (Remote Work Stats, 2020). This is important to recognize because virtual workers are a specialized group."

"As of March 2020, 88% of organizations encourage or require some or all their employees to work from home due to the COVID-19 pandemic (COVID-19 Work from Home, 2020). For my friends who were working from home on a regular basis pre pandemic, not much has changed in how they do their work. However, for those who were accustomed to working in a traditional office setting, virtual work has caused an essential cultural and logistical shift in how they perform their duties. The tasks of adapting to new technology, engaging with co-workers and leaders, and establishing a 7 work-life balance have steep learning curves, which can be challenging to less tech savvy and older workers (Gurchiek, 2016). Technology, such as various video-conferencing options, cloud-based file sharing, and enhanced processes, is becoming more commonplace in workspaces and even in some homes. Knowing how to navigate these useful tools is highly beneficial for people who must adapt to the technological demands of remote work environments. In addition to the technical aspects of telecommuting, it is also necessary to re-learn social etiquette as it relates to virtual interactions. For example, organizations that clearly define virtual work policies such as availability, data management, and what communication tools to use, can ensure that all employees are in sync and able to do their job in an efficient manner (Garcia, 2019)."

"Although working virtually is becoming more ubiquitous with the advancement of technology and advent of jobs replacing sustained, in-person labor, the study of virtual work is a moving target. Tencer (2017) cites a 2015 report published by Dell Technologies revealing that 85% of technology jobs have not even been created yet; by 2030, the virtual workplace will be inundated with technological positions that require advanced fluency in programming and digital system skills. Thus, it is imperative for organizations to take the time now to learn how to design processes, management, and comprehensive employee training that can redefine office environments that exist outside of allocated physical spaces."

"One of the biggest concerns about virtual work is the idea that employees who work remotely will be less productive without having supervision present. Stanford professor, Nicholas Bloom (2015), facilitated a two-year quantitative study at a large Chinese-based travel company (Ctrip) to analyze and compare 16,000 virtual employees 8 and employees that worked in the Ctrip headquarters. Bloom and Ctrip co-founder and CEO, James Liang—in an effort to analyze employee productivity—designed a test where 500 employees were divided into two groups: a control group (who continued working at the headquarters) and work-from-homers (who had to

have a private room at home, at least six-month tenure with Ctrip, and decent broadband access). Employees were assigned to groups based on their birthdays such that individuals whose birthday fell on an even date (e.g., 2nd, 4th) worked from home and individuals whose birthday fell on an odd date (e.g., 1st, 3rd) continued to work in the Ctrip office."

"Bloom's findings demonstrated a robust boost in productivity from the telecommuters; telecommuters tended to work a "true full-shift" compared to office workers who often left work before the end of their eight-hour workday. In addition, employee attrition decreased by 50 percent among telecommuters; they took shorter breaks, had fewer sick days, and took less time off. Lastly, the company saved nearly $2,000 per employee on rent by reducing the amount of office space at the Ctrip headquarters (Bloom et al., 2015). Overall, Bloom's study helps dispel early myths related to virtual work and productivity; virtual workers worked longer than office employees. In contrast, other research reveals the possible downsides to virtual work. In November of 2018, companies such as International Business Machines (IBM), The Bank of New York Mellon Corporation, Yahoo, and Aetna reversed their work from home policy and required their employees to return to the office. At that time, IBM noted that 40% of their employees had no office at all (Wilkie, 2019). While this decision was met with pushback from employees, these companies stated that they encountered a number of issues that affected efficiency and employee productivity with employees 9 working virtually. Several issues including, lack of training and resources, productivity, lack of monitoring, and trust, confronted IBM's mission to provide a profitable and engaging virtual environment. Moreover, most of the employees were frustrated with the lack of face time and the ability to created deep relationships with work colleagues (Wilkie, 2019)."

"With the outbreak of COVID-19, many workplaces, such as universities and colleges and corporate entities, scrambled to enter the virtual world with no defined blueprint. The quarantine forced work-at-home orders and have compelled several industries to realign and redesign their entire system. As states are now during a gradual reopening, physical workspaces are being redesigned to protect workers' health while maintaining company success and profits. And, importantly, we are during a country-wide paradigm shift about the relative value and necessities of in-person work. Even still, companies such as Wisconsin-based solutions provider, Camera Corner Connecting Point, that transitioned to work from home during the pandemic, still firmly

argue that employees are more productive and collaborative working shoulder to shoulder in an office space (Kovar, 2020). Conversely, the finance industry plans to move at least 5% of their previously employed on-site workforce to remote positions after COVID-19 ("Gartner Survey," 2020). This leaves the question: How can other industries become better equipped to make virtual work a viable and successful option? "

"Since March, more companies and organizations are in the trenches studying how to achieve better outcomes for both their organizations and employees regarding virtual work environments. Professional survey companies like Gallup and the Pew Research Center continue to administer surveys to organizations to examine if, and in what ways, 10 virtual work is most effective. In January 2020, Adam Hickman and Jennifer Robison of Gallup released data to U.S. federal agencies who cut back their telecommuting work options due to "[a] lack of data regarding remote worker's effectiveness" (Hickman & Robison, 2020). Studying the overall effectiveness of providing employees the option to work remotely, they noted, revealed "...54% of workers say they'd change jobs for the choice to work remotely or not." Furthermore, they found that companies that give employees the choice to work remotely will be at the top of job candidates' lists and will give the most talented workers a reason to stay (Hickman & Robison, 2020)."

"Hickman and Robison also examined ties between employee engagement, job flexibility, and job retention, affirming that engagement increases when employees spend some time working remotely and some time working in a location with their coworkers (also known as a hybrid working model). Moreover, the authors explain that the attrition rate was at an all-time high in 2016 and employees in the US today are quick to leave a company if their needs aren't met. Specifically, 51% of workers are now actively seeking and are open to new employment opportunities (Hickman & Robison, 2020)."

"To gain further understanding about the experiences of virtual workers, my capstone explores the primary factors that are associated with engagement by virtual employees and that contribute to their commitment to their team and organization. I assume that individuals need to feel a certain level of psychological safety, security, and trust to remain engaged in their work role, team, and organization. This assumption is based on Psychologist Abraham Maslow's hierarchy of needs (see Figure 1), which states that for people to be at their best, there are specific needs that have to be met first (physiological, safety, love/belonging, esteem, self-actualization; Maslow, 1954)."

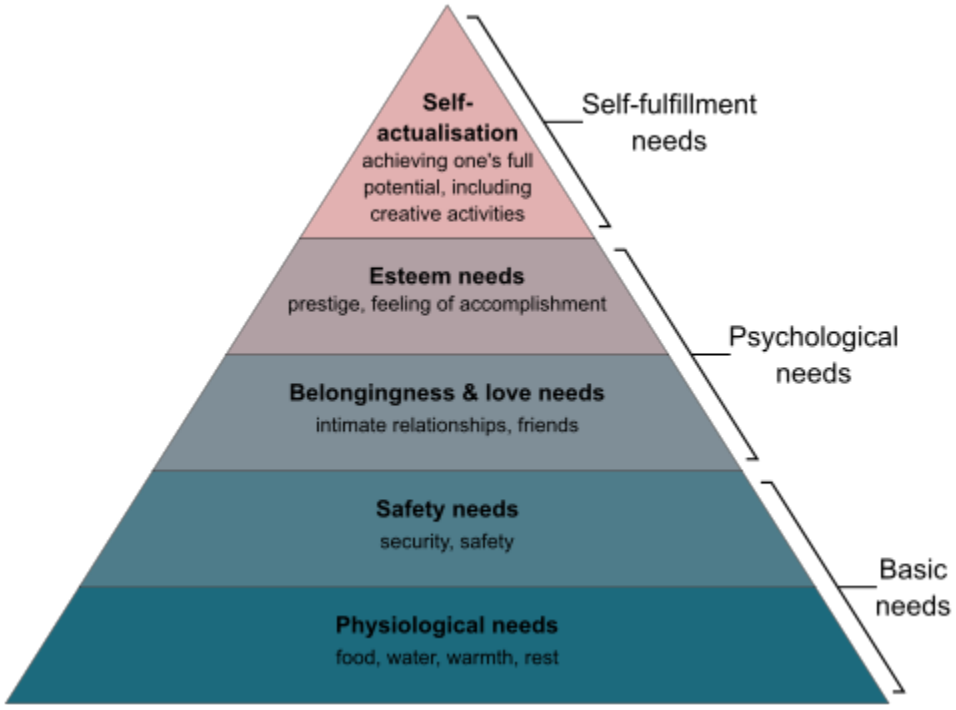

Figure 1 Maslow's Hierarchy of Needs

With Maslow's hierarchy model in mind, my aim is to extend current knowledge about what motivates virtual workers to be engaged and committed to their organization. Because virtual work is still a relatively new concept that many organizations are trying to understand, continuing to examine the attitudes and needs of virtual workers in various industries is essential. As time moves on and more technology-based jobs become prevalent, so will the need and people's desire to work virtually (Abrams, 2019).

Employee Engagement Explained

"When discussing the best way to encourage employees to perform as well as possible, the term employee engagement is integral to the conversation. The concept of employee engagement was introduced in 1990 by organizational behavior professor, William Kahn. In his paper, "Psychological Conditions of Personal Engagement and Disengagement at Work", Kahn explores how people physically, emotionally, and 12 cognitively assert themselves into their work roles. Kahn observed participants' behaviors in two different workplace settings: a summer camp and an architecture firm. He chose these environments because of the differences in how they are structured. The camp, a temporary system dedicated to the education and enjoyment of

adolescents, had little hierarchical structure and was a total system where work and nonwork boundaries blurred. The architecture firm was a permanent system that had rigid hierarchical structures and project teams with an ebb and flow rhythm based on projects and negotiations (Kahn, 1990)."

"Through his observations and in-depth interviews with employees, Kahn defined engagement as "an employee's ability to harness their 'full self' at work" (Kahn & Fellows, 2013, pp. 108). Kahn identified meaningfulness, safety, and availability as the three psychological conditions to make it possible for employees to be their full selves at work. Kahn's elements of safety, meaningfulness, and availability appear to me to complement Maslow's (1954) idea of trust. I believe all are necessary elements needed in the workplace to propel employees to reach their full potential."

"In addition, there are internal attributes, such as interest and motivation, that drive individuals to be engaged. In his 2009 book "Drive," business and human behavior researcher, Daniel Pink, focused on intrinsic motivation and how it connects to an individual's level of engagement in a task. Pink's Motivation Theory (also known as Motivation 3.0) includes three key components that contribute to intrinsic motivation: autonomy (the need to direct one's own life), mastery (the desire to improve), and purpose (working toward something more important than oneself; Pink, 2009). As humans, we crave the need to feel safe, belong, and that we matter (Maslow, 1954). 13 When individuals are provided with work environments that have all these elements, they can increase the effort they put into their work."

"Another important aspect of employee engagement is the role of communication. For workers to achieve any task effectively, their role needs to be clearly defined. When an employee's role is ambiguous, this can increase an individual's dissatisfaction with his or her role, hesitation over decisions, anxiety and confusion, resulting in ineffective performance (Qian, Li, Wang, Song, Zhang, Chen, & Qu, 2018). Unclear communication often leaves employees feeling confused, discontented, and distrustful (Krause, 2019). To avoid this, a work environment where employees feel socially supported by colleagues and leaders, receive performance feedback, and can voice their ideas needs to be constructed. Doing so keeps workers engaged, decreases attrition, and raises work quality and performance (Bakker, 2011)."

"Companies are making employee engagement a high priority, recognizing that a highly engaged workforce can increase bottom-line performance while reducing costs related to retention (Impact

of Employee Engagement, 2013). An organization that has engaged employees has a better chance of those employees remaining committed to the organization (Harter & Mann, 2017)."

How Does Employee Engagement Show Up in Virtual Work Settings?

"Recent research within the last few years suggests that virtual workers experience higher levels of workplace engagement when they feel that their personal values align with the organization's mission and their coworkers are not just colleagues, but also like family. Dr. Aaron Lee (2018) investigated how leaders can better manage the engagement level of their remote workers. Lee (2018) conducted an exploratory case 14 study of incidents that are critical for workplace engagement for remote workers using critical incident technique (CIT). CIT is a set of procedures used for collecting direct observations of human behavior in such a way as to facilitate their potential usefulness in solving practical problems and developing broad psychological principles (Flanagan, 1954). Using the CIT, Lee devised a taxonomy of responses to incidents that are critical for maintaining, strengthening, or eroding workplace engagement, such as interactive communication tools and face-to-face meetings when possible."

"Lee's empirical findings revealed that employees felt that their engagement strengthened when they (a) received tools to communicate with one another in real-time, (b) had a good organizational "fit," (c) had the freedom and flexibility to set their own work schedule, and (d) felt like their colleagues were more like friends and family than just co-workers. Conversely, employees reported that their workplace eroded when their organizational leadership restricted their autonomy; that is, when they couldn't set their own hours, office colleagues made them feel like outsiders, and when they felt isolated and left out of the social communication loop (Lee, 2018). Moreover, misalignment between an employee's values and their organization's values, can also diminish employee engagement. According to Chris Edmonds (2017), CEO and founder of The Purposeful Consultant Group, without values alignment, work cultures rapidly foster stress, erode employee engagement, and destroy productivity."

"Organizational commitment and employee engagement in virtual settings are concepts that continue to rapidly expand. At this crucial moment in time, companies are realizing the important role that both play in the success of their business. Economists at McKinsey Global Institute predict that by 2030, most people will work completely 15 remotely or have hybrid schedules that make full-time office work obsolete (Selyukh, 2019). With the onset of the COVID-19 pandemic, we

may hit that percentage sooner than expected. Knowledge about virtual work is imperative if a company wants to succeed. When it is implemented well, virtual work improves performance and increases employee satisfaction, which will benefit a company's overall bottom line (Abrams, 2019)."

Two-Way Street: Employee Organizational Commitment

"The first time that I ever felt committed to a job was when I was self-employed. I had a small cleaning business for a few years. While there were a lot of growing pains, I still found myself feeling committed to doing what I needed to do to keep it alive. There was a sense of pride that I had, a determination to achieve that surpasses all my other work experiences. I was committed to making my business succeed. But what exactly is commitment? The Merriam-Webster dictionary (2020) defines it as "the state or an instance of being obligated or emotionally impelled." Commitment is intrinsically linked to one's dedication, devotion, allegiance, and loyalty in all realms of life."

"Psychologists John Meyer and Natalie Allen (1991) further explained that "Employees who are strongly committed are those who are least likely to voluntarily leave the organization." Meyer and Allen introduced their Three Component Model of 16 Commitment in "The Human Resource Management Review" in 1991. The model explains that commitment to an organization is a psychological state that has three distinct components: affective commitment, continuance commitment, and normative commitment (Meyer & Allen, 1991)." The difference between the three types of commitment is as follows:

- Affective commitment = Affection for your job
- Continuance commitment = Fear of losing your job
- Normative commitment = Having a sense of obligation to stay

"Throughout our careers, most people are more than likely to experience one—if not all three—of these types of commitment. To retain employees, organizations must make sure that commitment is reciprocal (Juaneda-Ayensa, Emeterio, & Gonzalez-Menorca, 2017). According to Meyer and Allen, employees who have a high level of affective commitment to their organization and feel a sense of belonging and will be more likely to stay (Meyer & Allen, 1991)."

“In Employee Engagement and Commitment (2006), Robert J. Vance, a consultant in human resources and organizational management, explained that there are similarities between a relationship of commitment between two people and an employee’s relationship with an organization. Vance suggests that the exchange between the organization and employees is built on reciprocity. In exchange for an employee’s skills and commitment, organizations provide some form of value, such as job security, benefits, and fair compensation (Vance, 2006, p. 4). Furthermore, to maintain high levels of employee engagement, CEO and President (respectively) of Fishbowl, David Williams and Michelle Scott, offer the “5 Rs” from the Harvard Business Review as a good tactic 17 that organizations can use to build a stronger relationship with employees.” The 5 Rs include:

- responsibility, showing employees that they are trusted by giving them responsibilities that allow them to grow;
- respect, making it a priority to show outward respect for employees on a regular basis;
- revenue-sharing, tying a part of employee’s wages to the company’s performance to help align their interests with the company’s revenue and profit;
- reward, rewarding employees with something that speaks to their emotional needs and that goes beyond monetary compensation (e.g., recognition in front of the company, handwritten notes, company and department parties); and
- relaxation time, being generous with and providing enough time off (e.g., sick days, family vacations, parental leave).

“David Williams and Mary Scott (2012) argue that employers that make an effort to show their employees that their well-being is a priority, by establishing a culture focused on building strong relationships, have a better chance of keeping employees for the longterm (Williams & Scott, 2012).”

“The “5Rs” concept resonates with Barbara Romzek’s findings in her 1989 article “Personal Consequences of Employee Commitment.” Through a two-wave panel study that surveyed the attitudes of a random sample of 485 public employees in 1982 (and resurveyed in 1984), Romzek discovered that high levels of organizational involvement resulted in higher non-work (i.e., life outside of work) and career satisfaction.” Romzek states:

When individuals feel committed to their work organizations, they share the organization's values. They derive personal meaning from their work experiences because pursuing organizational goals is consistent with their personal values (Romzek, 1989, p. 650).

"Employee Engagement and Employee Commitment Overlap Employee engagement and employee commitment are two concepts that tend to overlap. Both concepts revolve around the level of satisfaction an employee feels for their work role (engagement) and for the organization that they belong to (commitment). As evidenced in my review of the literature, the optimal goal for an organization is to devise work environments and policies that retain employees who are both passionate in their work role and really love their organization. Just because an employee is engaged in their work, does not mean that they are committed to their organization. Reversely, an employee can be committed to their organization while not feeling engaged in their work (Smith, 2015). Employee engagement and employee commitment are similar, but not synonymous."

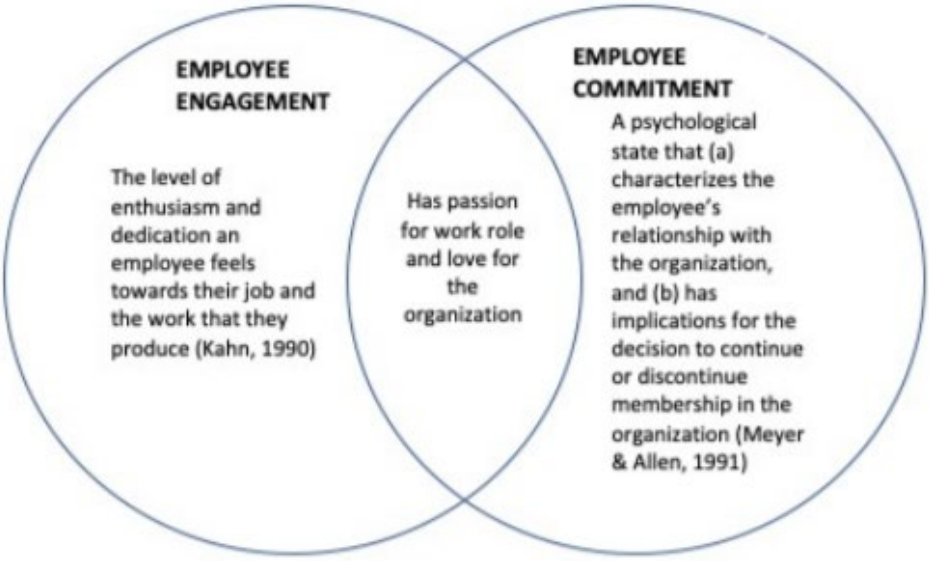

Figure 2 Employee Engagement/Employee Commitment (Benjamin, 2020)

"In their 2013 article "Creating the Best Workplace on Earth," organizational culture experts Rob Goffee and Gareth Jones discuss elements that should be considered when to designing the best company on earth to work for." Goffee and Jones highlight six elements that organizations should strive for:

1. letting people be themselves
2. unleashing the flow of information
3. magnifying people's strengths
4. standing for more than shareholder value
5. showing how the daily work makes sense
6. having rules that people can believe in.

CHAPTER 03: APPLICATION DEVELOPMENT

3.1 System Architecture

This is the architecture of the system we have developed:

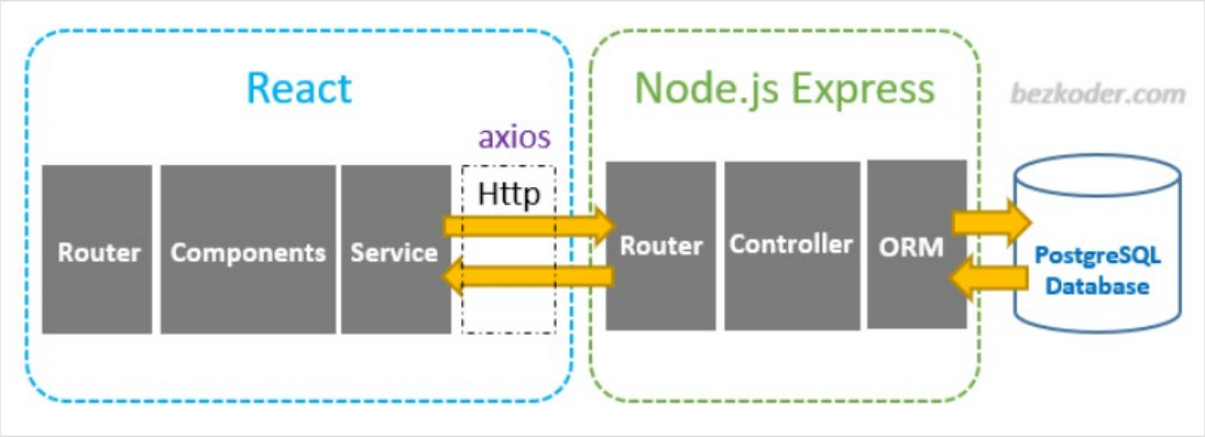

Figure 3 React, Node.js Express, PostgreSQL Architecture

- Node.js Express exports REST APIs & interacts with PostgreSQL Database using Sequelize ORM.
- React Client sends HTTP Requests and retrieves HTTP Responses using Axios, consume data on the components. React Router is used for navigating to pages.

We followed this architecture of our product on a CI/CD pipeline to deploy our app on GCP app engine

3.2 Software Development Analogy

We built the software from the basic and then added all other features on top of the basic project. This approach helps in scenarios if the project is stopped due to some reasons or the product is transferred to another team then the product built till now has a value of itself as it has been built from basic and then added extra features to give the project vertical as well as horizontal scaling up as when required.

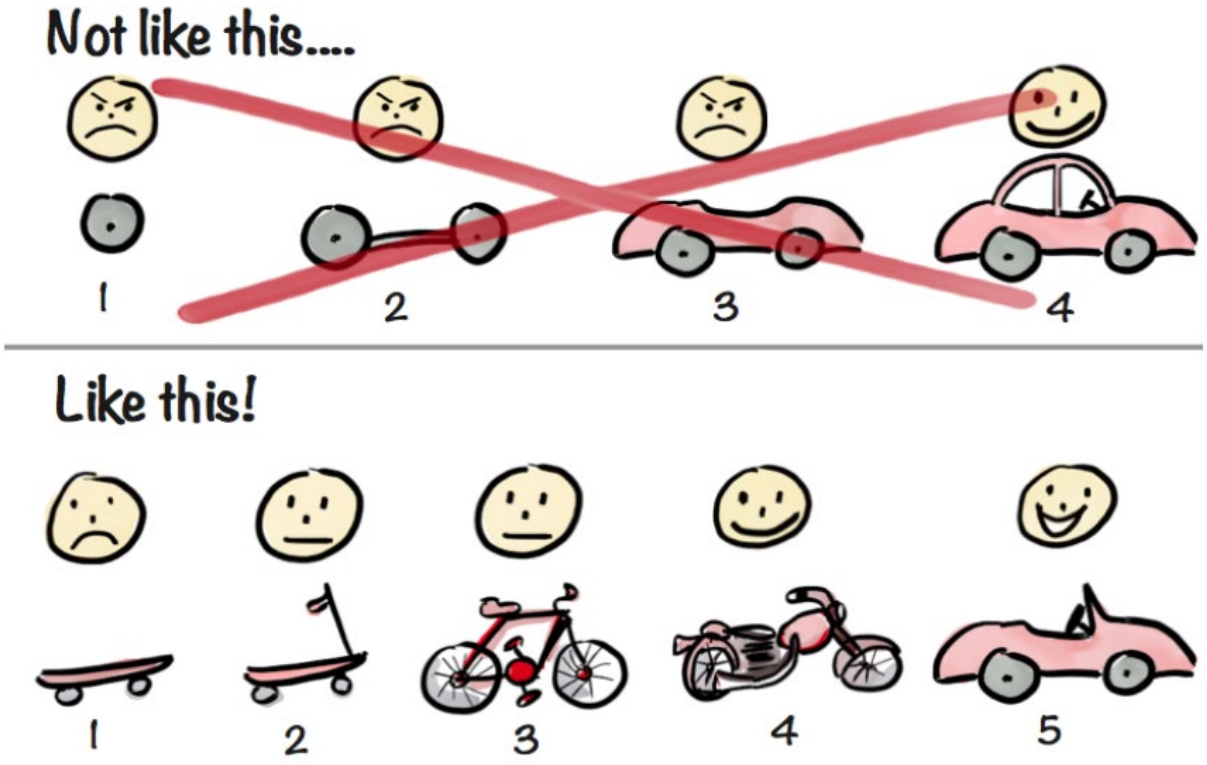

Figure 4 Illustration of MVP product development

The image is not meant to be taken literally. Instead, it's intended to show some of the key benefits of agile development over waterfall methods, particularly about Minimum Viable Product (MVP):

- Value is delivered at each stage of development.
- The solution is delivered and improved upon in an iterative model.
- At each stage, the solution can be evaluated and adjusted if needed.

This is neither incremental nor iterative development; you can never build a car by starting with a skateboard, bicycle, or motorcycle. As Kniberg notes in his blog post about the image, it describes product development, not software development.

The image requires too many hypotheticals to create a viable path for development.

Images and mental models are never perfect, but they do have to be good enough. This venerable image simply isn't good enough. In the real history of automobile, it took many years of development before an automobile could outperform a horse in simple tasks, and we've since had a century to improve automotive technology. Explanatory images should be simpler than the

concept that you are trying to illustrate, and this image is more complex than agile development, because it tries to compress 125 years of automotive development into a few images. Further, for anyone who knows something about automobiles or manufacturing, this image is more of a hindrance than a help.

Hidden within this image, however, is a much better analogy waiting to be unpacked: the bicycle. Nearly everyone has ridden a bicycle at some point, and both the technology and history of its development are simple enough to be grasped quickly. Furthermore, the development of bicycle technology — at least in the early years, at a large scale — was both iterative and incremental in a true agile way.

Agile SDLC methodology is based on collaborative decision making between requirements and solutions teams, and a cyclical, iterative progression of producing working software. Work is done in regularly iterated cycles, known as sprints, that usually last two to four weeks.

In Agile, you often don't design for needs that could come up in the future, even if they seem obvious. This is a point where development teams and security teams tend to struggle. Security teams aim to anticipate attacks, attackers, and risks. As needs emerge and are refined over time, security requirements can emerge that weren't anticipated at the beginning of the process. This is normal and natural in Agile, but it can be disorienting to security people who aren't able to secure against various likely attacks.

A key takeaway from a security perspective is that Agile is all about the sprint. If a security requirement isn't in the backlog, it won't be scheduled for delivery in a sprint. If it isn't scheduled in a sprint, it won't get done. When security needs are articulated in the backlog, they're prioritized alongside everything else

3.3 Application Development Flow

During the project assigned to us by the company we were split in teams of 4, then we took the start week for brain storming on the idea and also tried out different tech stacks to know which of them is well suited for our kind of project.

Then we started building the User Landing Page/Dashboard for a Team Lead which included the features of inviting team members, scheduling a call, analysis of the user filled forms about their hobbies and interests. Dashboard also includes routes to Flexi poll, Find a Friend, Sports Recommendations, Movie Recommendations and Games pages. All these features were developed at letter stages which will be explained in the upcoming pages.

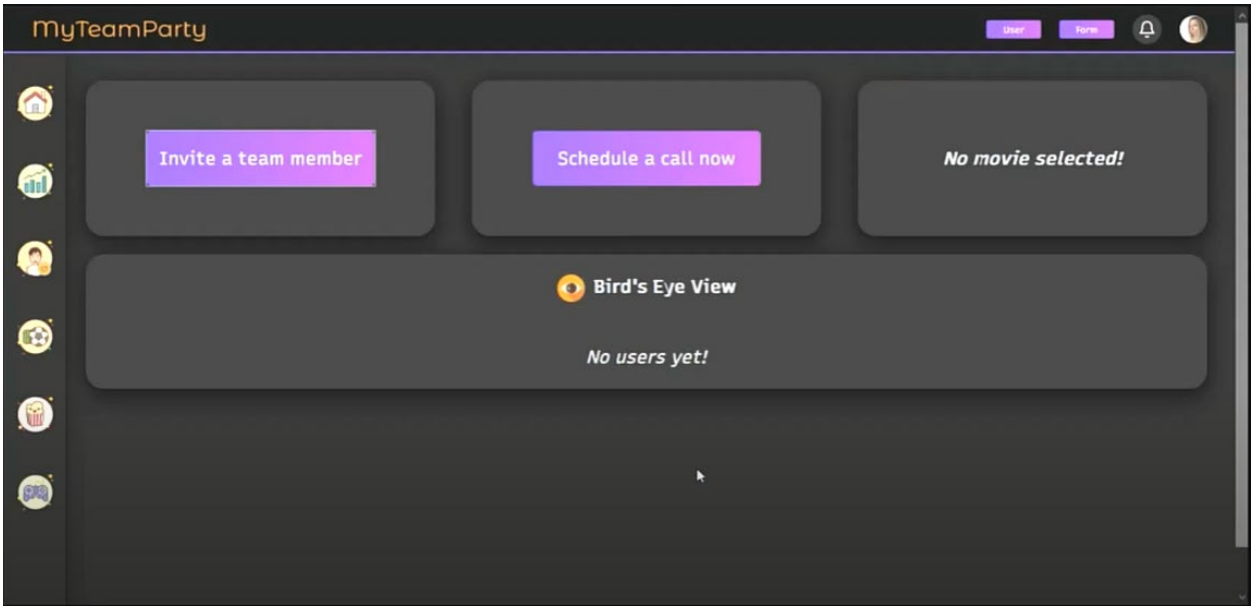

Figure 5 Landing Page for Team Lead

We started with developing the easy invite feature it included two parts on the frontend adding the email chips with domain check and send the list of emails to the backend using axios. The backend will get the list of all the emails and using nodemailer it will send a predefined personalized email to each of the employee to join the team.

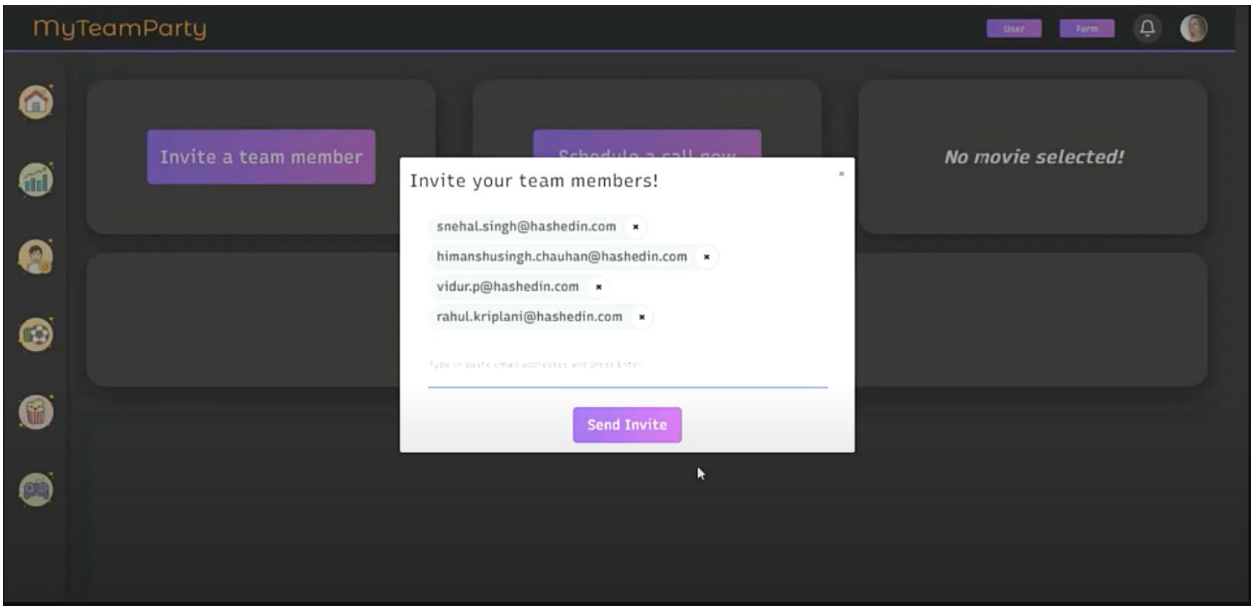

Figure 6 Invite your Team Members

For better User Experience we added a toaster on this feature, this will toast successful message if the email has been sent successfully, if there are some problems this will also toast error message based on the reason of the error occurred.

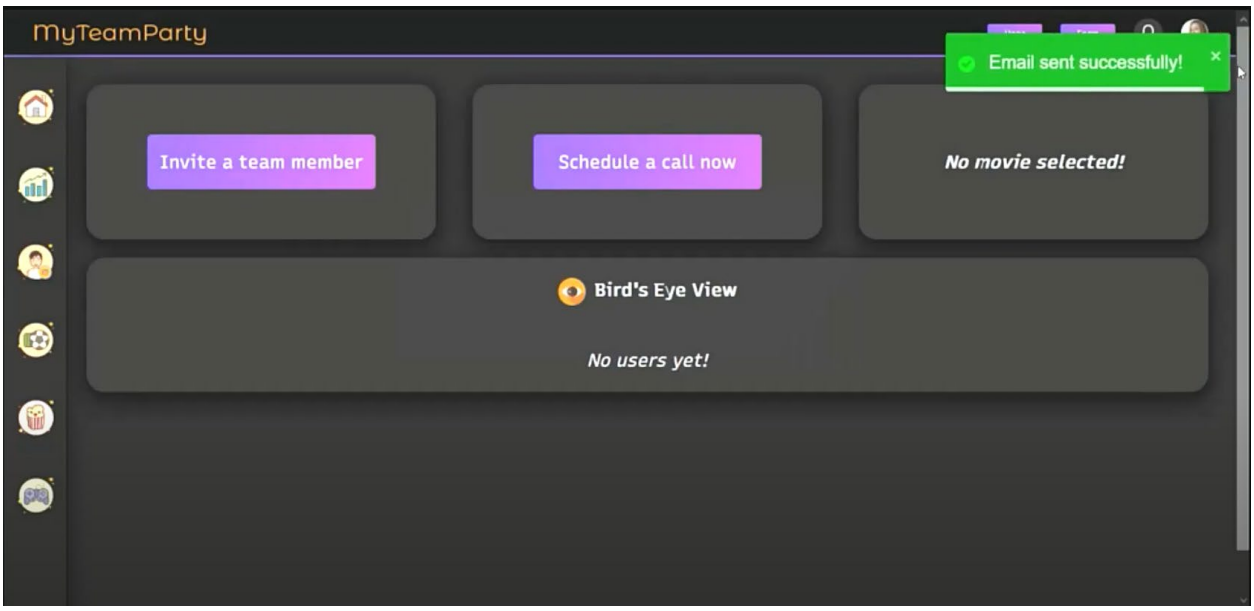

Figure 7 Toast on Email Sent

The personalized emails are sent using nodemailer, Nodemailer is a module for Node.js applications to allow easy as cake email sending. We developed an algorithm at backend to send

the UI page as an email to each user to fill the onboarding form. For using our own Gmail account for sending the email, the first thing we have to do is turn on the Two Factor Authentication, then we need to visit our Google Account page and in the security option turn on the feature for less secure apps and then generate a password which will be used for sending email through only.

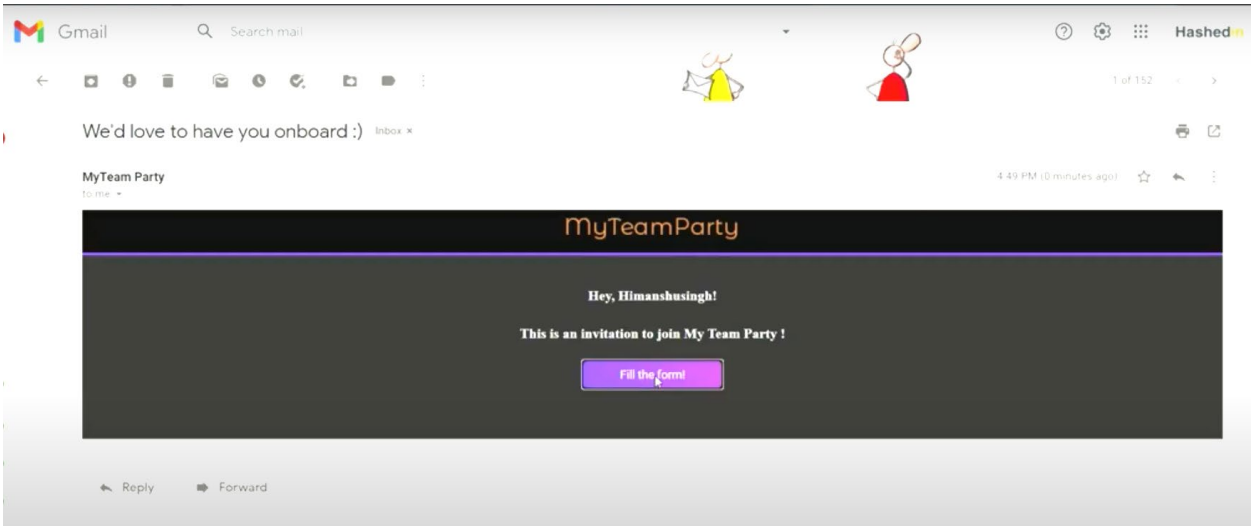

Figure 8 Personalized Email to Employees

On clicking fill the form button on the email, it will lead the user to fill a form like below for getting the user details like what he/she is good at, the genre of movies they like, the sports they enjoy watching and the virtual games they like to play. All these information we passed using the props to the react frontend and then were posted to the backend through post apis which stored

these details of each user in PostgreSQL database which will be later on fetched with the get apis and used for analysis and all other kind of recommendations.

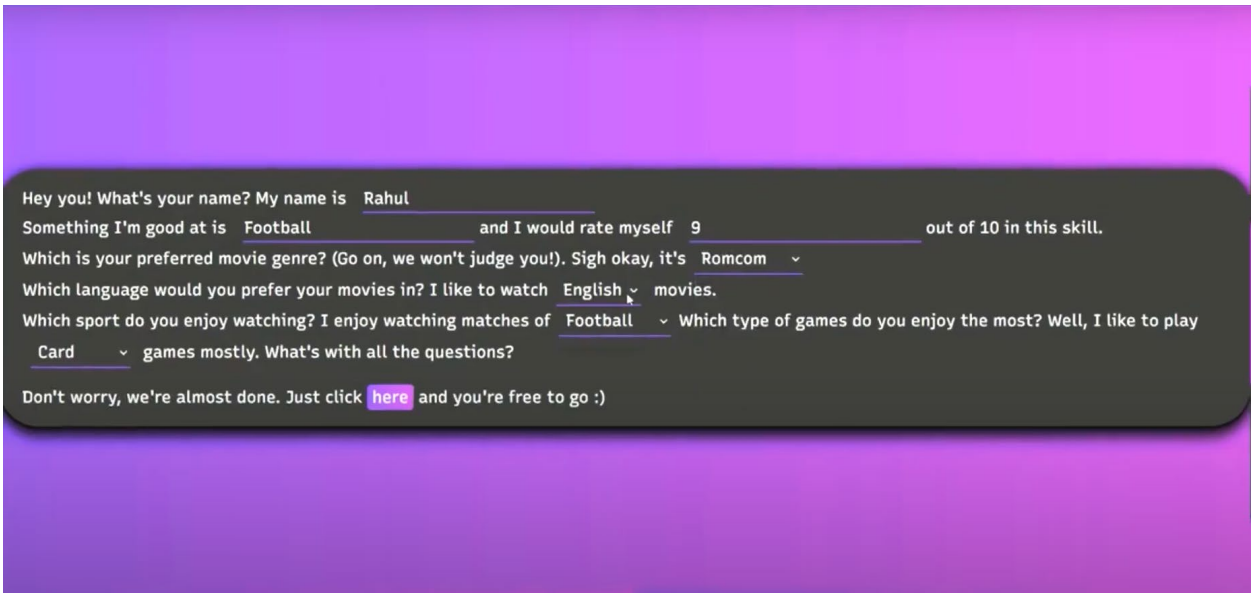

Figure 9 Onboarding Form

As all the employees filled the form all the data was collected in the backend which was now fetched to provide the useful insights, but before the insights all the data was fetched from the backend and was transformed into user friendly pie charts which is easier for any user to understand and also looks better rather than just some old fashioned numbered data. Moreover, we embedded some pins (React Tip Components) on each of the pie charts which would tell us about the part of the pie chart. These analysis are the base of all the other features in our app like from the analysis of the favorite movie genre we fetch all the top rated movies from moviedb api which can be used by the team lead for selecting the movie which needs to be screened, and from the sports analysis we fetch the relevant upcoming sports events for them to make their life easier and

the same happens for games with this analysis the favorite game is marked in the list of all games to play.

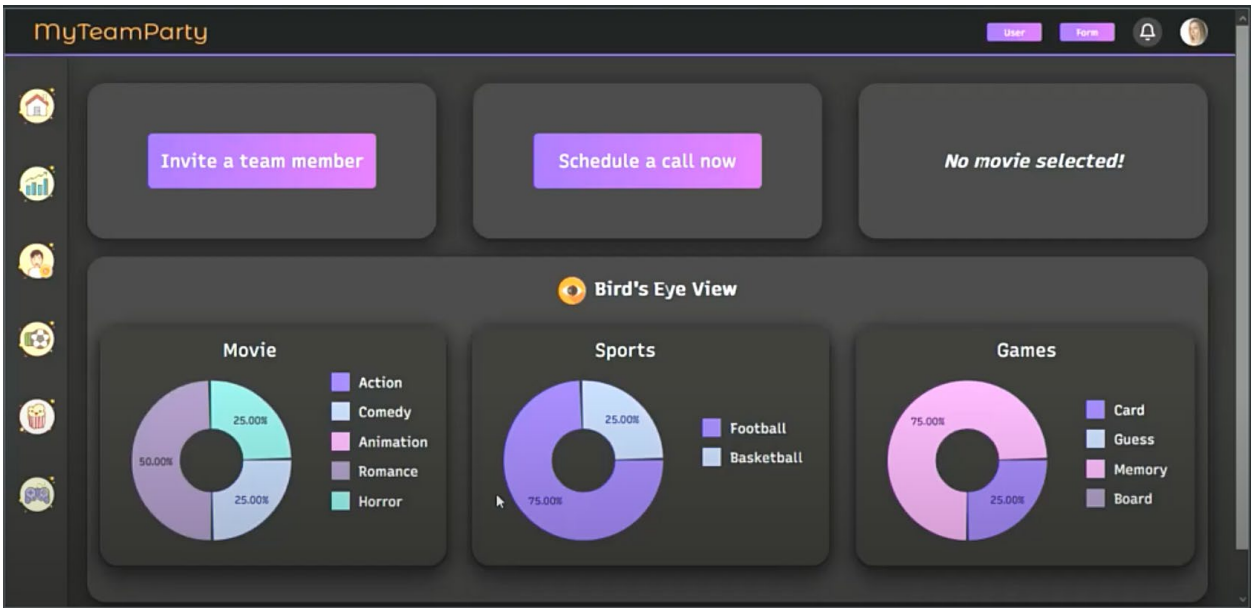

Figure 10 User Analysis (Bird's Eye View)

Each pie chart also accommodate an in depth data for each of the feature, like in the below sports pie chart reveals the details about how many user like each kind of sports, this helps the team lead

in understanding the ratio of each of the options so that the team lead in the future if wanted can change the options which are being used the least.

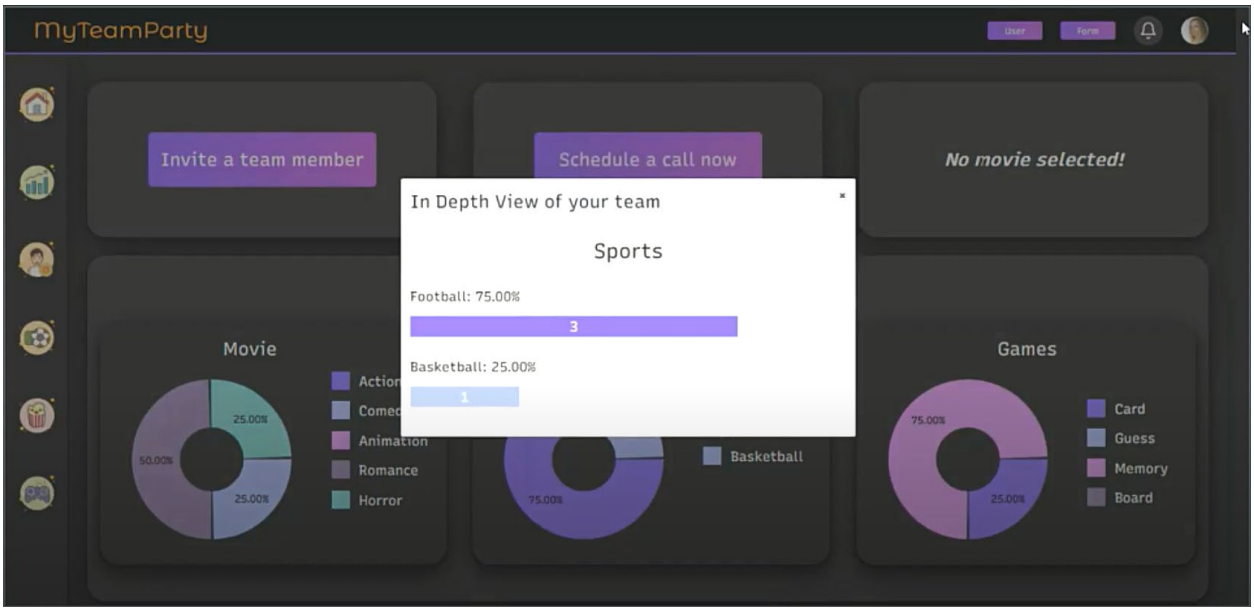

Figure 11 In Depth Analysis of the Team

From the collected data the app finds the favorite sport that the team like to watch and then returns the details of upcoming sporting event which the team can decided and watch together. We have used the rapid api for fetching these details, like for football we used the api to fetch the English

Premier League and for basketball we used the NBA api, for each of them we just had to create an account and get the api keys for each one of them and use it for fetching the list.

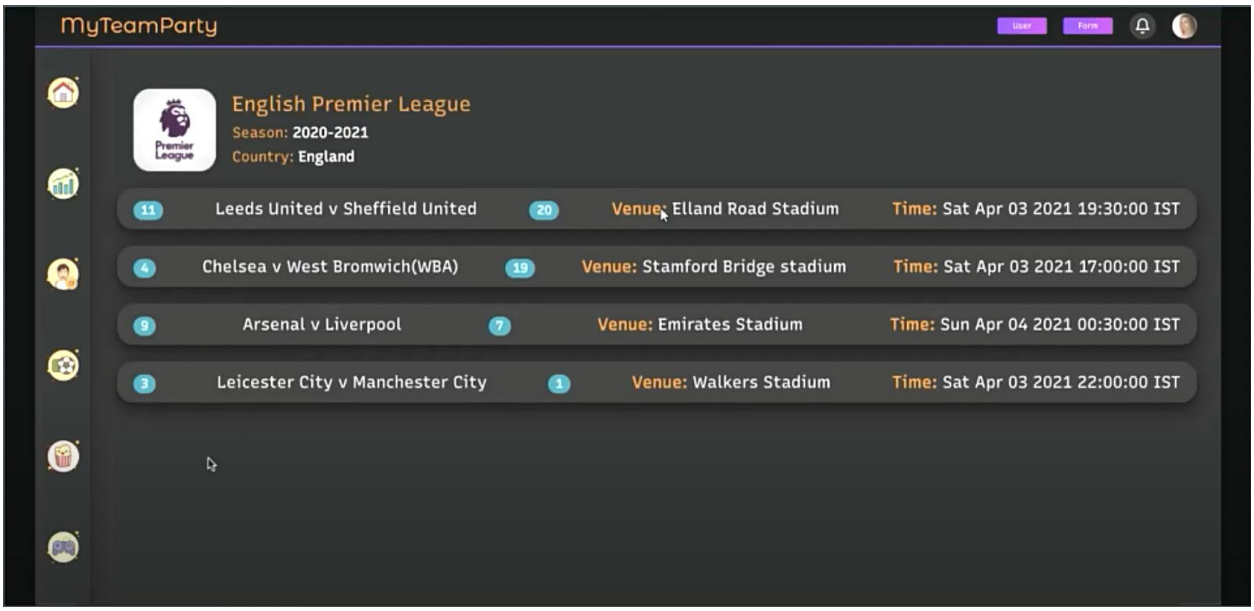

Figure 12 Upcoming Sports Event

The app also lists a set of top 9 movies based on the genre which was favorite among the team members which was collected from each user at the time of onboarding. For the movie also we used rapid api moviedb which has the list of all the movies and to the fetch request we filtered the movies based on genre and language and then fetched the top 9 from the list. The json included a

lot of information regarding the movies but we only used the poster, movie name, imdb rating and the movie description which is rendered in the form of cards.

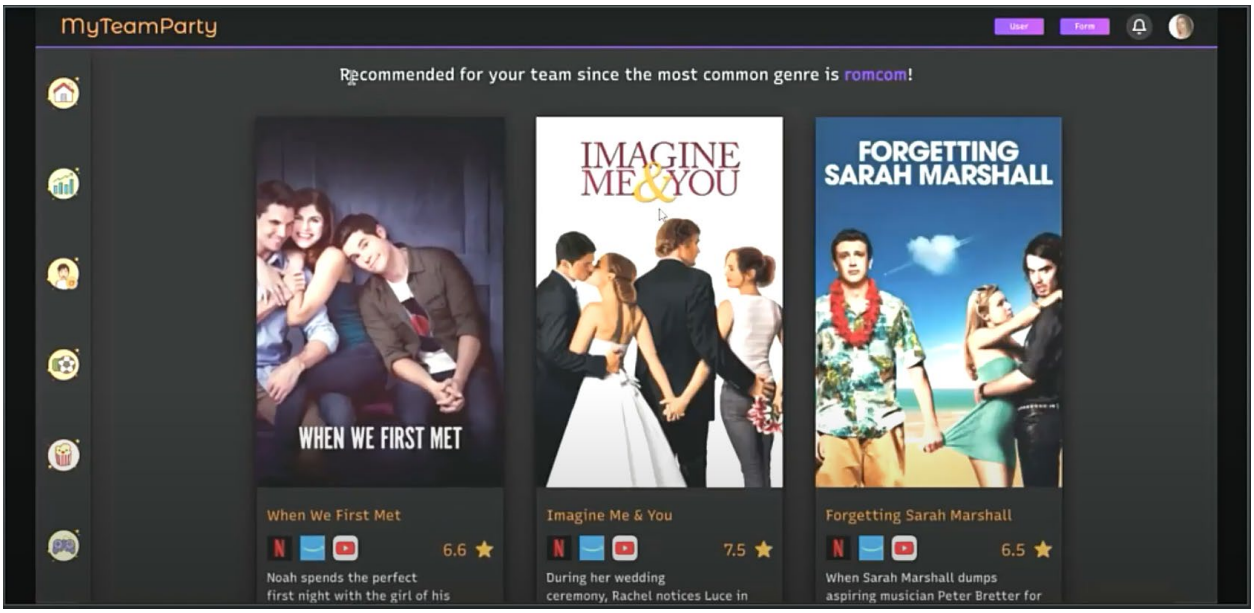

Figure 13 Recommended Movies (Top Genre)

On each of the movie card we have redirection buttons, one of those is a redirection to the movie trailer on YouTube, for this we used the slug of the search page on YouTube and then inserted the movie title to this slug which generated the redirection link to the trailer of the movie.

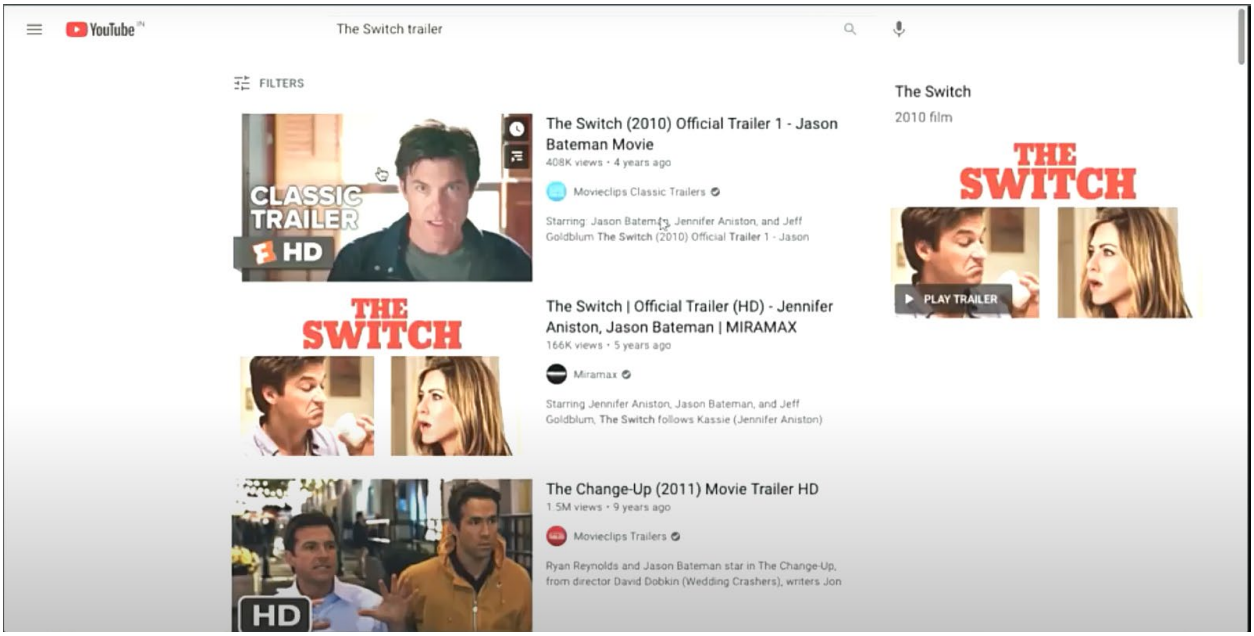

Figure 14 Redirection to Movie Trailer on YouTube

Similarly we have a redirection button for the Prime Video which will lead to the movie we have selected to watch, for this we searched the slug for a prime video movie and then altered the slug based on the movie title which gave us a redirection link to that specific movie.

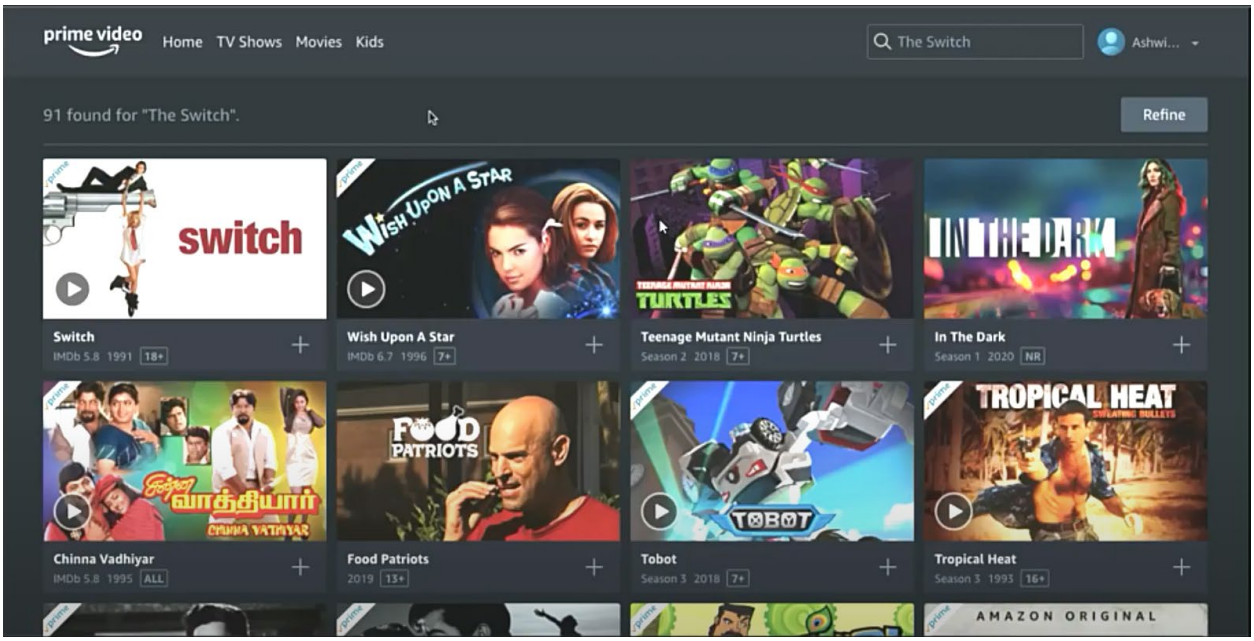

Figure 15 Redirection to Movie (Prime Video)

In addition to the prime video we also redirect the user to an alternative streaming site like Netflix by altering the slug of a Netflix Movie search page, this is how on each card we have specific buttons which lead to the specific platform based on the movie card on which it resides on.

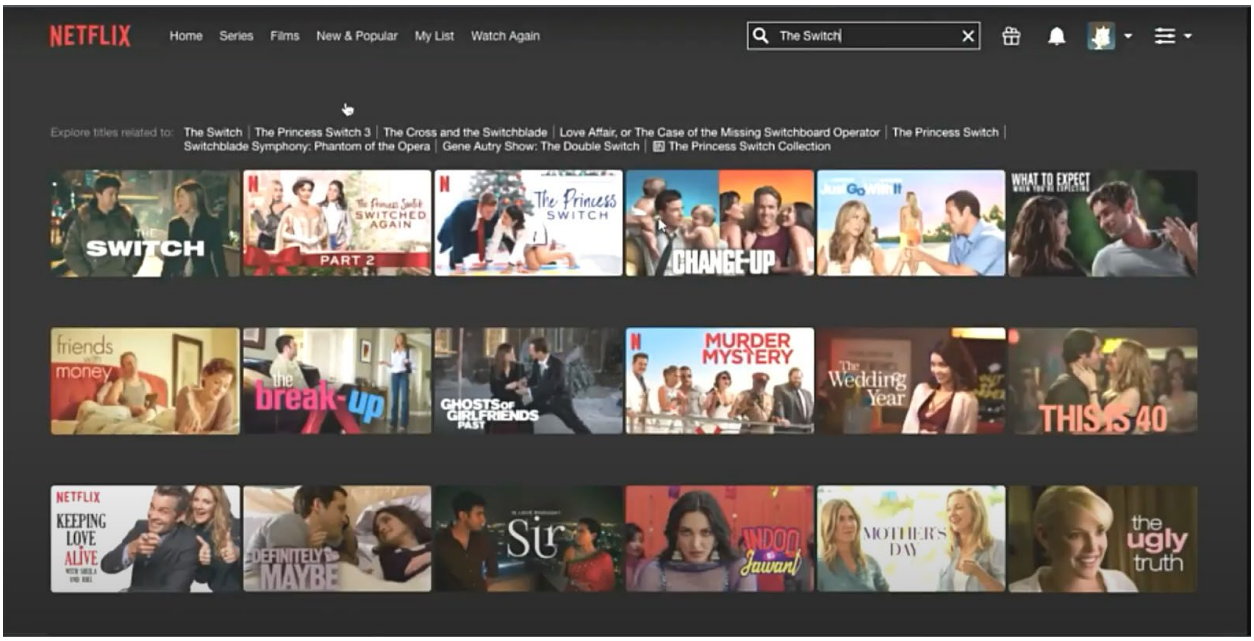

Figure 16 Redirection to Movie (Netflix)

As the team lead may want to select a movie for screening, clicking on the selected movie card triggers the toast to give an alert that the movie has been selected and that movie is also fed into the database which can be later retrieved on the dashboard page for the team lead.

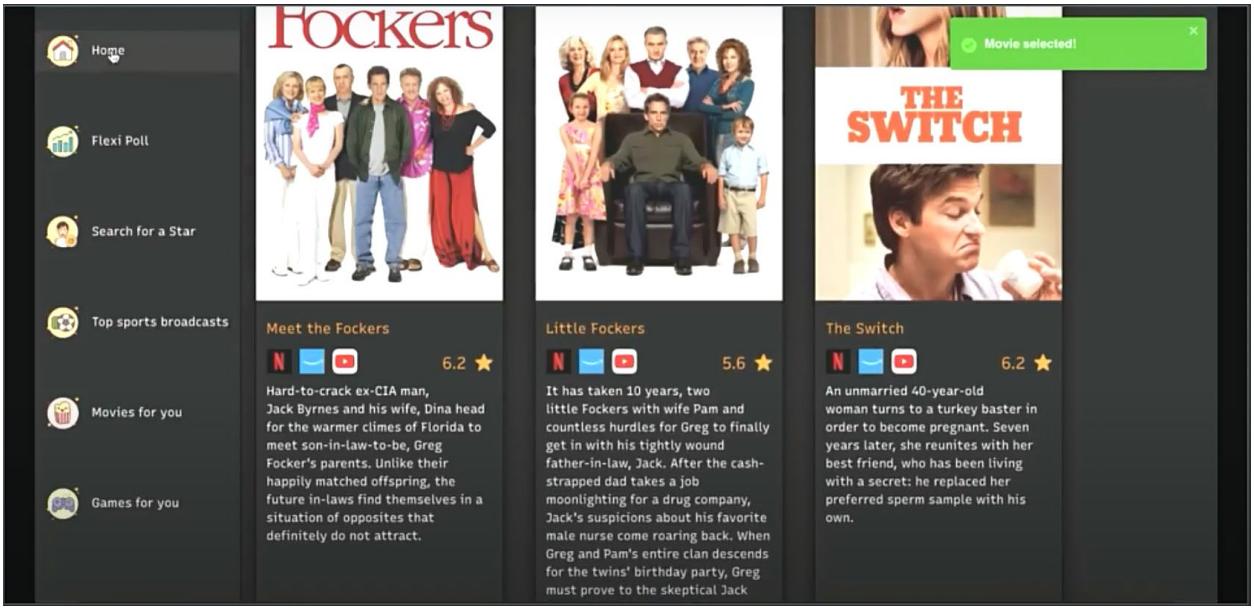

Figure 17 Selecting a Movie

As you can see in the below image the movie which was selected from the recommended movie page is now available on the Team Lead dashboard which also have the buttons for redirection to YouTube, Amazon Prime Video and Netflix with the imdb rating of the movie.

Figure 18 Selected Movie on Dashboard

We also made the cards for the game, at present the games are hard coded into the backend which is fetched by the Game Zone, here based on the analysis of the preferred games are marked with a Most Popular tag on the top right which suggest any user to go and play such kind of games which are most preferred.

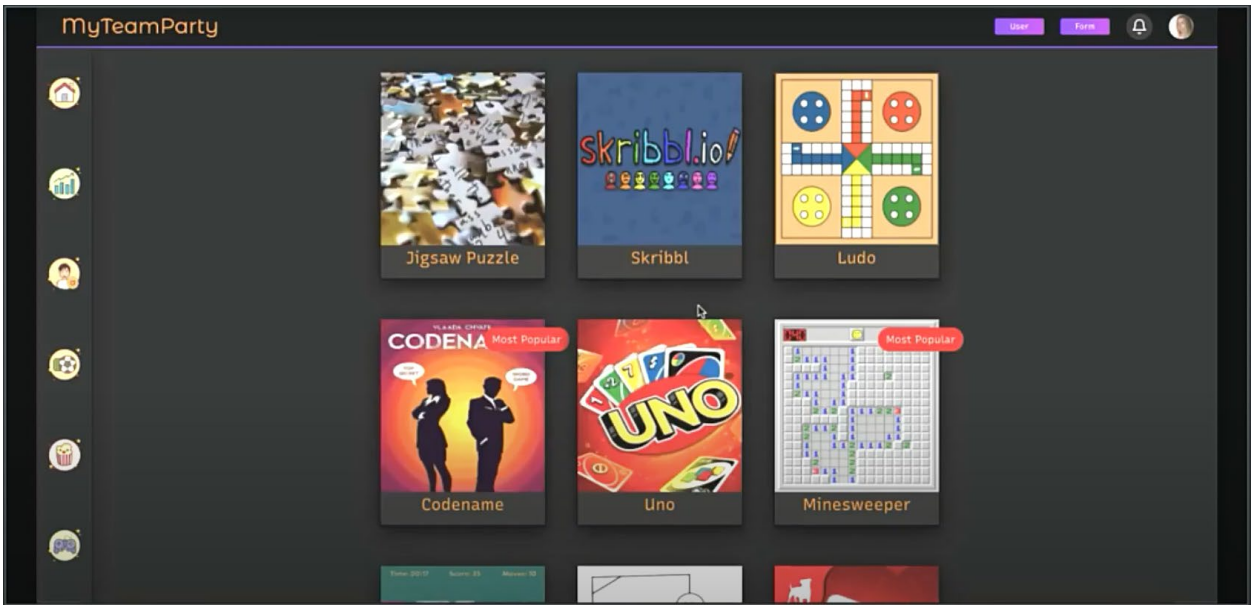

Figure 19 Games page with tags on Recommended

On hovering over the game cards, they flip back to give the direction and rules on how to play the game and reveals a redirection button to go and play that game.

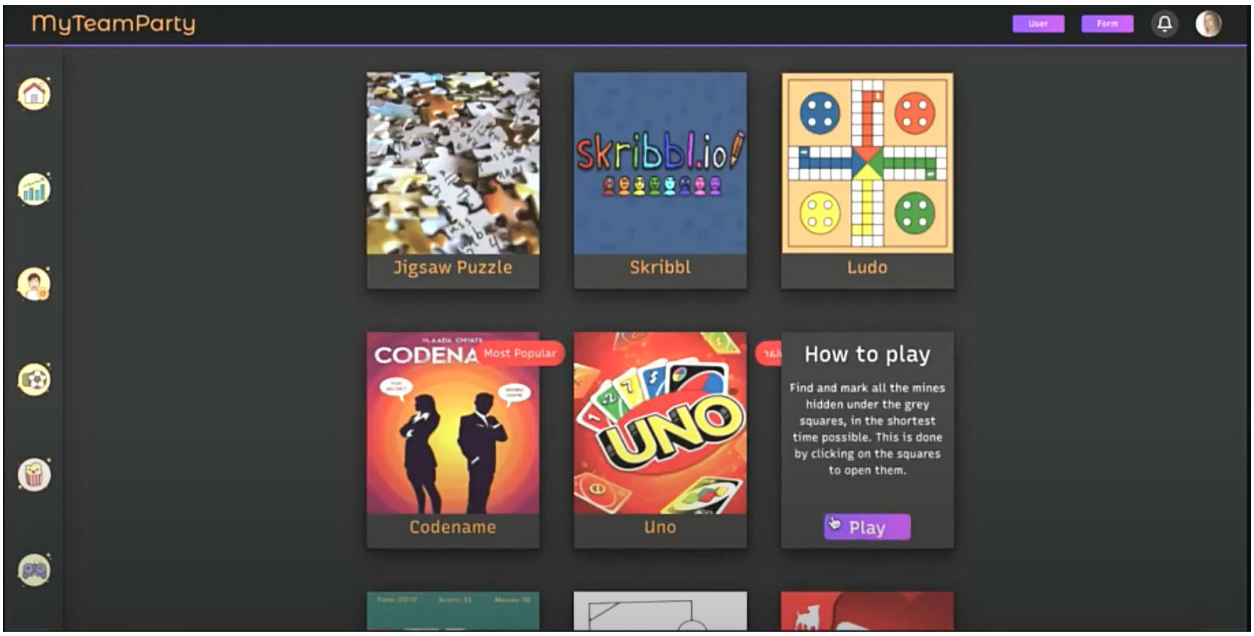

Figure 20 Game Card flip for Direction

The redirection button to play the game leads us to the game which we want to play so we can enjoy the game with ease and least possible hassle.

Figure 21 Redirection to the Game

The feature of Scheduling a Call lets the Team Lead to schedule Google meet with the members of the Team, on clicking the send link button the same link will be shared to all the team members in their respective google calendar as well as will also be popped up as a notification.

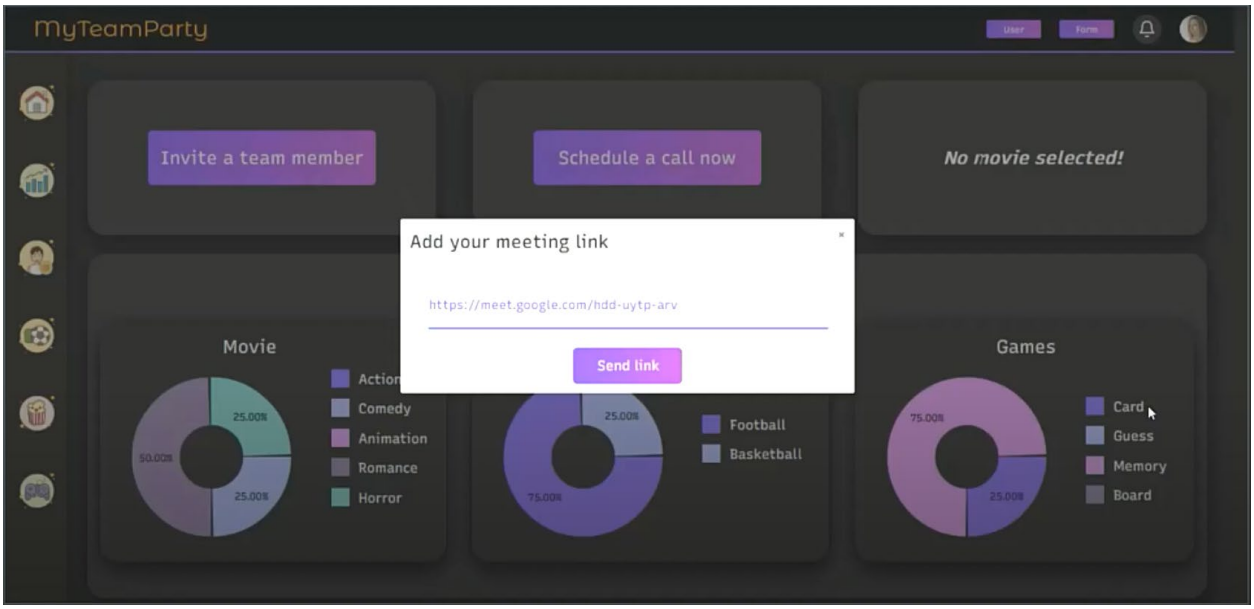

Figure 22 Scheduling a Google meet

The meet will be added on the Google Calendar of each of the team member and will be popped as a notification on the dashboard for easy to reach.

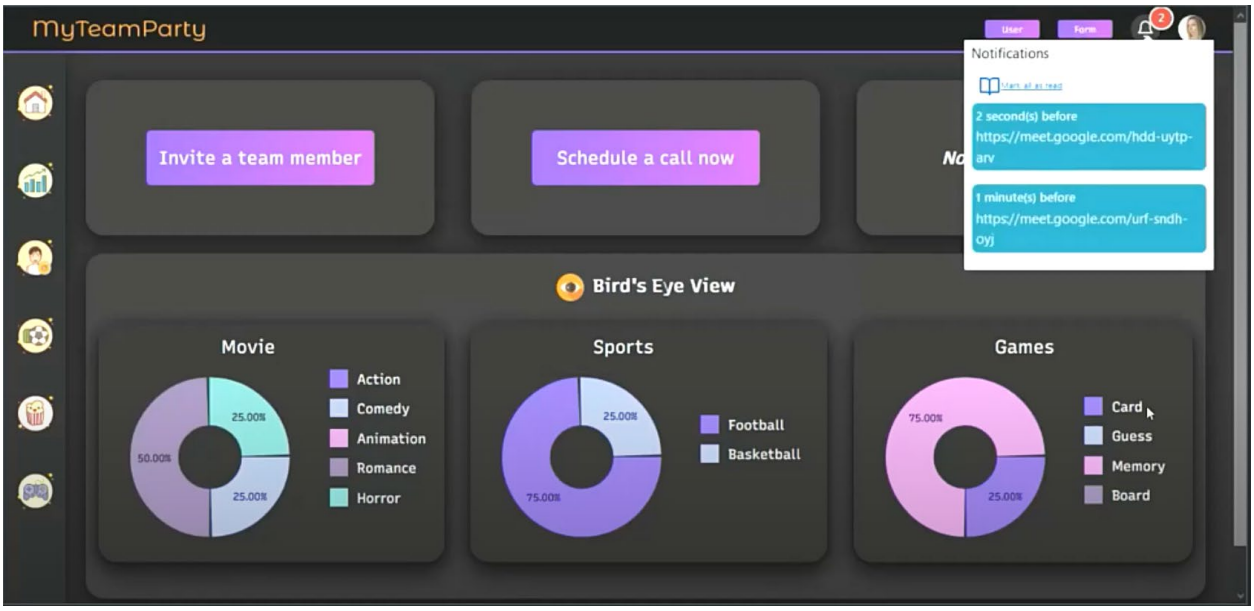

Figure 23 Meeting Notification

As the Team Lead may need to generate a flexible poll based on the mood and demand we made a feature of a flexible poll, which can be created by the Team Lead and will be sent to each of the employees for them to select their preference.

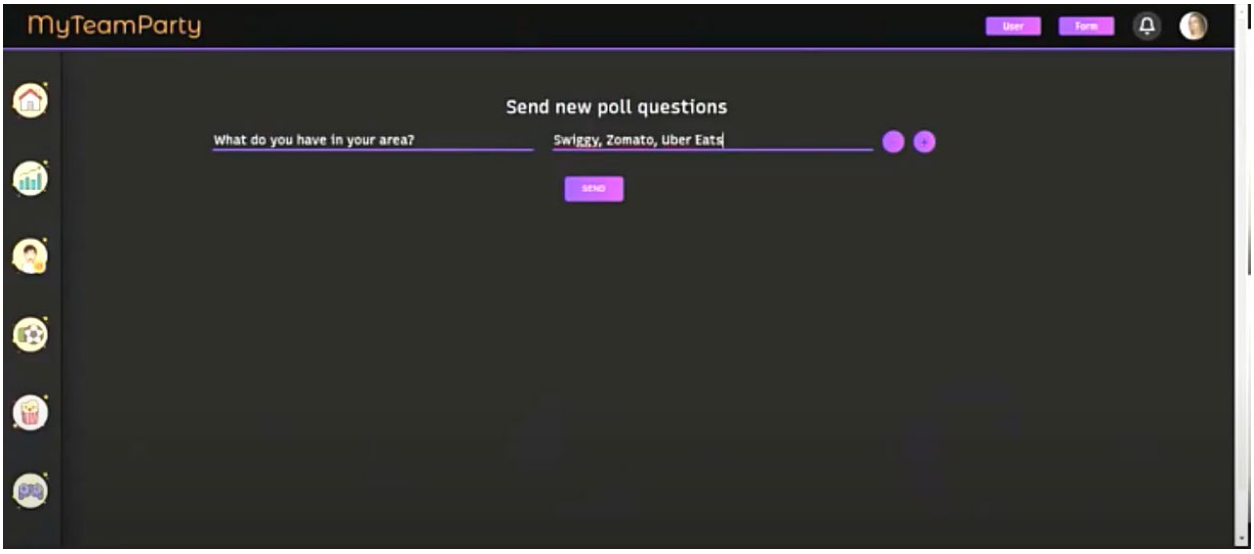

Figure 24 Generating a flexi poll

The flexi poll will generate a form which will be sent over email to each of the employee to fill it and the data for each user will be added in the database and that data's analysis and insight would be shared with the team lead in the form of pie chart for easy apprehension and then based on the analysis deciding what the Team Lead's further action plan will be.

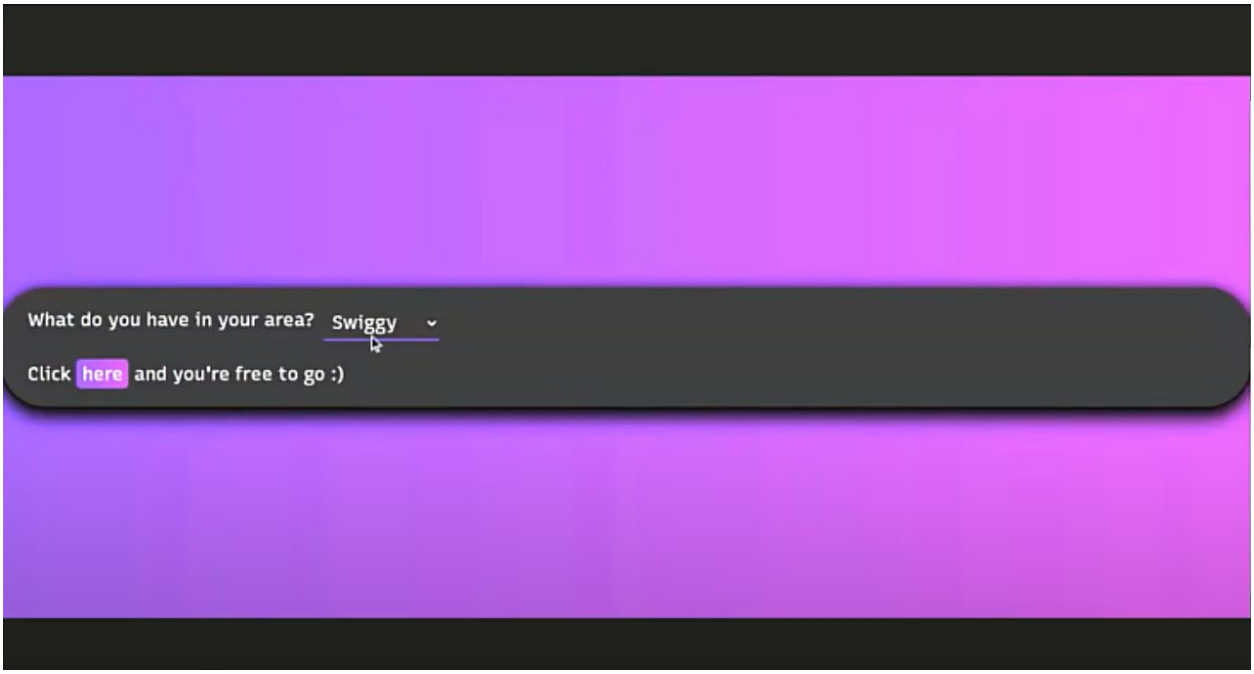

Figure 25 Poll created

Each of the user/employee has their own dashboard where they can see their data like their highest score, the last seen movie and they could also find other employees based on the hobbies and liking.

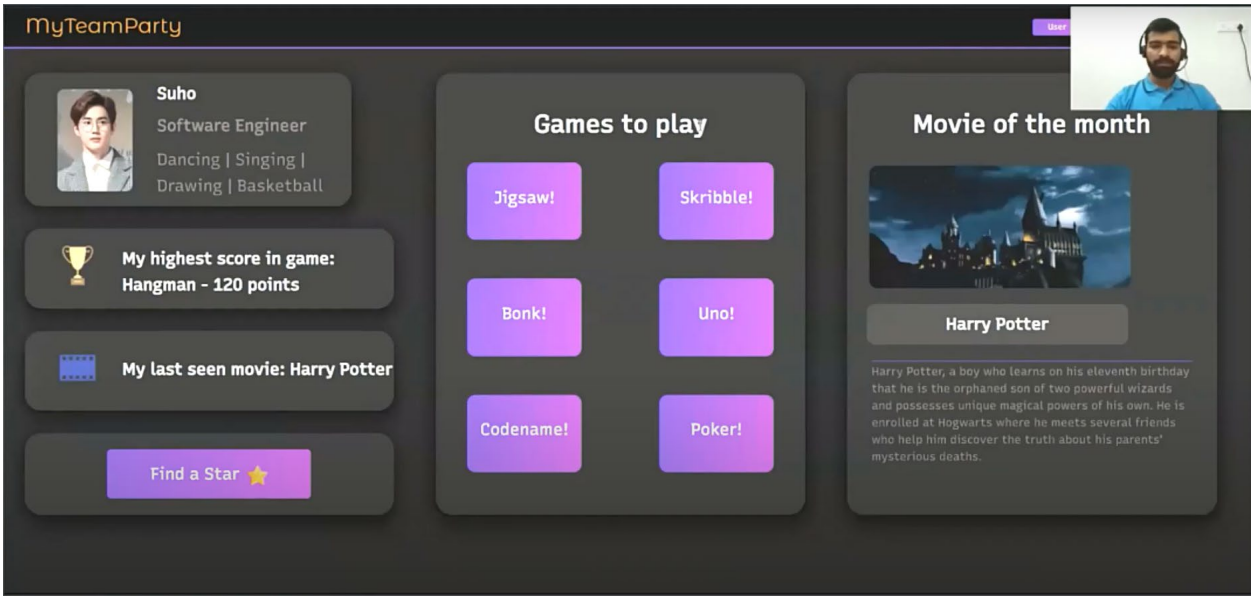

Figure 26 Employee Dashboard

The feature for finding another employee to bond over was named as Finding a Star, here we can search on the thing which we want to do or play, the app will list out all the other employees based on the search result from which we can pin out those with whom we want to bond over that specific topic and have fun and collaborate with them in the future as well.

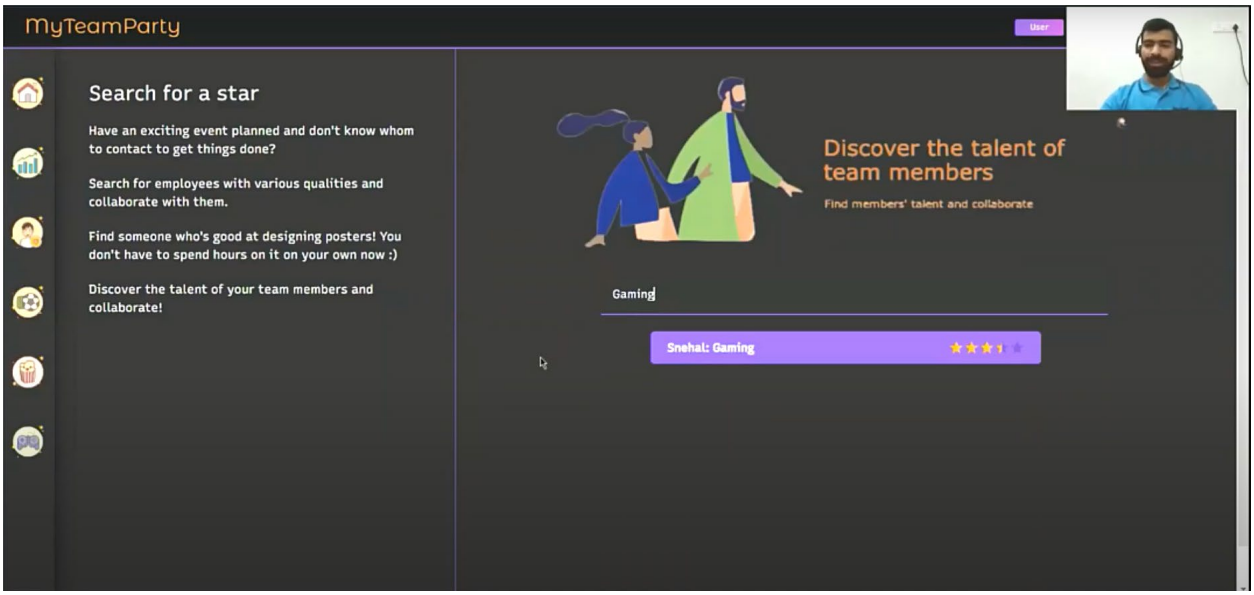

Figure 27 Search a Star

CHAPTER 04: RESULTS

4.1 Results Achieved

We were able to develop a product which can possibly increase the team engagement in a virtual environment like the present. We developed a way to do a virtual onboarding of all the employees and at that time asked for their preferences which will become the base of the product as all the analysis and the recommendations are mostly based on this form filled data by each employee.

These data gave insights to the Team Lead about their teams, these data were represented in a pie chart format for better visual understanding, from the same data we fetched the favorite of each part which were used as a recommendation criteria for some MVP features like Movie, Sports and Game Recommendations.

We were able to fetch the top-notch movies based on genre from the list of thousands of movies using the moviedb api, these were presented to the Team Lead for selecting the next movie for screening and watching with the team together. We also had redirection to the movie trailer and the streaming platforms like Prime Video and Netflix.

We also fetched the details of the upcoming sports events like the English Premier League and NBA, so that the team can decide how to spend their weekends together and have fun. We used rapid apis for this purpose and only fetched those matches which will be held on weekends.

We made redirection cards to popular gaming platforms on top of these game cards had indication of Most Popular tag based on the analysis of the games data from all the users.

Other than this we added a flexi-poll which can be triggered at any time and can be used for collecting information and insights about upcoming and flexible things to be done each day. We will have polls that would be sent by the team lead to all the members and in that poll, there could be anything related to some engagement aspects like their food preferences so that team lead can arrange for that. For another session there can be another poll with different choices. This is to incorporate the dynamic nature of a team and their activities.

The app was also able to generate a Google meet invite to all the team members and to send these invite link to each user which will be popped as a notification to their dashboard.

For each user/employee there is a personalized dashboard where he can see details regarding the previous team engagement event held and how he performed. Apart from this the employees can also find someone to bond with using Search for Star feature which finds the employees with similarity to have fun and collaborative activities.

4.2 Limitations

1. The apis used have a free trial period after which to use them we must pay for each fetch request.
2. The app has not been built for multiple teams, at present it will only satisfy the needs of a single team, when the team engagement of that team has been completed then only any new team can use these features for their benefits. And for multiple teams' accommodation the app can not remember an employee which was a part of any previous team so that the app can use that previous fed data.
3. The onboarding form of the app is hard coded, there is no way right now for having a dynamic onboarding form, but for this purpose only we came up with the Flexi Poll feature which has dynamic nature and that can be use to trigger dynamic polls as and when required.
4. In case of past events the app only remembers the last movie that was screened.
5. We have no way for screening the movies together for this we are relying that the Team Lead would the Netflix feature for watching movies together.
6. The games are also hard coded in the app, that is there is only a list of 9 games at present and we are yet to figure out how to play some amazing, fun and multiplayer games together with the least hassle possible.
7. The notifications are not working as thought and moreover the notifications are shown on the Team Lead Dashboard which must have been shown in the Employee Dashboards
8. We have no login and authentication functionality at present that is why the user identification and most of the above stated tasks are partial complete or incomplete.

4.3 Future Scope

- Engagement activities like team lunches and games are beneficial -
    - So, we will integrate popular Food Ordering platforms for making bulk orders.
    - Integrate fun games into the application and Accommodate multiple teams
- We will build this project for multiple teams
- We'll use Open Authentication and Single Sign-on to restrict access only to authenticated users, based on the authentication token we would be able to accomplish several pending tasks such as notifications and the details of the previous events and also have same team members in different.
- Recommendations make everyone's life easier.
    - We plan to use sophisticated ML algorithms to make more accurate recommendations
    - We will add more popular Sports to have even more topics to bond over!

REFRENCES

Abrams, Z. (2019, October 1). The Future of Remote Work. American Psychological Association, 50, 54. https://www.apa.org/monitor/2019/10/cover-remote-work

Bakker, A. (2011, August). An Evidence-Based Model of Work Engagement. Current Directions in Psychological Science, 20(4), 265-269. https://www.jstor.org/stable/23045784

Bloom, N. A., Liang, J., Roberts, J., & Ying, Z. (2015, February). Does Working from Homework? Evidence from a Chinese Experiment. The Quarterly Journal of Economics, 130(1), 165-218. http://dx.doi.org/https://doi.org/10.1093/qje/qju032

Cohen, A., & Hudecek, N. (1993, June 1). Organizational Commitment-Turnover Relationship Across Occupational Groups: A Meta-Analysis. Group & Organization Management, 18(2), 188-213. http://dx.doi.org/https://doi.org/10.1177/1059601193182004

Demeter, M. (2020). The Case for Autonomous Leadership in the Remote Workplace. https://www.fastcompany.com/90508758/the-case-for-autonomousleadership-in-the-remote-workplace

Edmonds, C. (2017). 4 Steps to Ensure Values Alignment and Reduce Workplace Stress. https://blog.hrps.org/blogpost/4-Steps-to-Ensure-Values-Alignment-andReduce-Workplace-Stress

Employment by Major Industry Sector. (2020). https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm

Flanagan, J. C. (1954). The Critical Incident Technique. Psychological Bulletin, 51. https://www.apa.org/pubs/databases/psycinfo/cit-article.pdf

Gan, V. (2015). What Telecommuting Looked Like in 1973: A Vision of Remote Work from Home Before the Personal Computer. https://www.theatlantic.com/technology/archive/2015/12/what-telecommuting-lookedlike-in-1973/418473/

Garcia, A. (2019). How to Transition Your Team to Remote Work. https://www.entrepreneur.com/article/329560

Gartner CFO Survey Reveals 74% Intend to Shift Some Employees to Remote Work Permanently. (2020). https://www.gartner.com/en/newsroom/press- 44 releases/2020-04-03-gartner-cfo-surey-reveals-74-percent-of-organizations-to-shiftsome-employees-to-remote-work-permanently2

Gese, E. (2020). Is Your Remote Sales Team Feeling Disconnected. https://pivotaladvisors.com/2020/01/23/remote-sales-team-feeling-disconnected/

Goffee, R., & Jones, G. (2013). Creating the Best Workplace on Earth. https://hbr.org/2013/05/creating-the-best-workplace-on-earth

Greenbaum, Z. (2019). The Future of Remote Work. American Psychological Association, 50. https://www.apa.org/monitor/2019/10/cover-remotework

Gurchiek, K. (2016). HR Can Help Prevent Older Workers from Becoming Tech Dinosaurs. https://www.shrm.org/resourcesandtools/hrtopics/organizational-and-employee-development/pages/keep-older-workers'-tech-skillsrelevant.aspx

Harter, J., & Adkins, A. (2015). What Great Managers Do to Engage Employees? https://hbr.org/2015/04/what-great-managers-do-to-engage-employees

Harter, J., & Mann, A. (2017, April 12). The Right Culture: Not Just About Employee Satisfaction. Gallup. https://www.gallup.com/workplace/231602/rightculture-not-employee-satisfaction.aspx

Heinz, K. (2020). How to Avoid Employee Burnout with a Remote Team. https://builtin.com/employee-engagement/employee-burnout#3

Hickman, A., & Robison, J. (2020). Is Working Remotely Effective? Gallup Research Says Yes. https://www.gallup.com/workplace/283985/working-remotelyeffective-gallup-research-says-yes.aspx

Hirsch, A. (2019). Building and Leading High Performing Remote Teams. https://www.shrm.org/resourcesandtools/hr-topics/technology/pages/buildingleading-high-performing-remote-teams.aspx

Juaneda-Ayensa, E., Clavel San Emeterio, M., & Gonzalez-Menorca, C. (2017, July 20). Person-Organization Commitment: Bonds of Internal Consumer in the Context of Nonprofit Organizations. Frontiers in Psychology. http://dx.doi.org/https://doi.org/10.3389/fpsyg.2017.01227

Kahn, W. A., & Fellows, S. (2013). Employee Engagement and Meaningful Work. American Psychology Association, 105-126. http://dx.doi.org/https://doi.org/10.1037/14183-006

Kanter, R. (1968). A Study of Commitment Mechanisms in Utopian Communities. American Sociological Review, 33(4), 499-517. http://dx.doi.org/DOI: 10.2307/2092438 Kluch, S. (2020). Leading Remotely: What Managers Need to Keep Teams Engaged. https://www.gallup.com/workplace/296528/leading-remotely-managersneed-keep-teams-engaged.aspx

Kohll, A. (2018). The Evolving Definition of Work-Life Balance. https://www.forbes.com/sites/alankohll/2018/03/27/the-evolving-definition-of-work-lifebalance/#63fa259d9ed3

Kovar, J. (2020). Some May Work from Home Permanently After COVID-19: Gartner. https://www.crn.com/news/running-your-business/some-may-work-fromhome-permanently-after-covid-19-gartner

Krause, L. (2019, August 15). The Effects of Poor Communication in the Workplace [Blog post]. https://www.thealternativeboard.com/blog/the-effects-ofpoor-communication-in-the-workplace

Latest Work-At-Home/Telecommuting/Mobile Work/Remote Work Statistics. (2020). https://globalworkplaceanalytics.com/telecommuting-statistics

Lee, A. M. (2018). An Exploratory Case Study of How Remote Employees Experience Workplace Engagement (Doctoral dissertation). https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=6848&context=dissertations

Lewicki, R. J., & Benedict Bunker, B. (1996). Developing and Maintaining Trust in Work Relationships. In Trust in Organizations: Frontiers of Theory and Research (pp. 114-139). []. http://dx.doi.org/10.4135/9781452243610.n7

Lewis-Black, M., Bryman, A., & Liao, T. F. (2004). Likert Scale. The SAGE Encyclopedia of Social Science Research Methods. http://dx.doi.org/https://dx.doi.org/10.4135/9781412950589.n495

Lurey, J. S., & Raisinghani, M. S. (2001). Am empirical study of best practices in virtual teams. Information & Management, 38(8), 523-544. http://dx.doi.org/https://doi.org/10.1016/S0378-7206(01)00074-X

Martins, L. L., Gilson, L. L., & Maynard, M. T. (2004, May 24). Virtual Teams: What Do We Know and Where do We Go from Here. Journal of Management, 30(6), 805-835. http://dx.doi.org/https://doi-org.proxy.library.upenn.edu/10.1016/j.jm.2004.05.002

Maslow, A. H. (1954). The instinctoid nature of basic needs. Journal of Personality, 22, 326–347. https://doi.org/10.1111/j.1467-6494.1954.tb01136.x

Mautz, S. (2018). A 2-Year Stanford Study Shows the Astonishing Productivity Boost of Working from Home. https://www.inc.com/scott-mautz/a-2-yearstanford-study-shows-astonishing-productivity-boost-of-working-from-home.html

Meyer, J. P., & Allen, N. J. (1991). A Three-Component Conceptualization of Organizational Commitment. Human Resource Management Review, 1(1), 61-89. http://dx.doi.org/doi:10.1016/1053-4822(91)90011-z

Most Employees Are Working from Home Due To COVID-19. (2020). https://facilityexecutive.com/2020/03/most-employees-working-from-home-coronaviruspandemic/

Mowday, R. T., Porter, L. W., & Steers, R. M. (1982). Employee-Organization Linkages: The Psychology of Commitment, Absenteeism, and Turnover.

https://www.google.com/books/edition/_/HNO7AAAAIAAJ?hl=en&s=X&ved=2ahUKEwin2qnJnrfqAhWZmHIEHTrKAfYQ8fIDMBd6BAgUEAM

Parris, J. (2014). Telecommuting, Virtual Jobs, and Other Ways to Say "Work from Home". https://www.flexjobs.com/blog/post/telecommuting-virtual-jobsways-say-work-home/

Penhale Smith, N. (2015). The 4 Influencers of Employee Engagement and Commitment. https://www.effectory.com/knowledge/the-4-influencers-of-employeeengagement-and-commitment/

Pickard-Whitehead, G. (2020). 66% of Employees Now Working from Home Due to Coronavirus Outbreak. https://smallbiztrends.com/2020/04/work-fromhome-during-coronavirus.html

Pink, D. (2009). Drive. New York, NY: Penguin Group.

Qian, J., Li, X., Wang, B., Song, B., Zhang, W., Chen, M., & Qu, Y. (2018). A Role Theory Perspective on How and When Goal-Focused Leadership Influences Employee Voice Behavior. Frontiers in Psychology, 9. http://dx.doi.org/https://doi.org/10.3389/fpsyg.2018.01244

Raghurama, S., Garud, R., Wiesenfeld, B., & Gupta, V. (2001, June). Factors contributing to virtual work adjustment. Journal of Management, 27. http://dx.doi.org/ 10.1016/S0149-2063(01)00097-6

Rogers, K. (2018, July-August). Do Employees Feel Respected. https://hbr.org/2018/07/do-your-employees-feel-respected

Romzek, B. S. (1989). Personal Consequences of Employee Commitment. The Academy of Management Journal, 32(3), 649-661. http://dx.doi.org/DOI:10.5465/256438

Schuman, H. (2002, Summer). Sense and Nonsense About Surveys. Contexts, 1(2), 40- 47. 47 Selyukh, A. (2019). Will Your Job Still Exist in 2030? https://www.npr.org/2019/07/11/740219271/will-your-job-still-exist-in-2030

Snowball Sampling: Definitions, Advantages and Disadvantages. (2020). https://www.statisticshowto.com/snowball-sampling/

Tencer, D. (2017). 85% of Jobs That Will Exist in 2030 Haven't Been Invented Yet: Dell. https://www.huffingtonpost.ca/2017/07/14/85-of-jobs-that-willexist-in-2030-haven-t-been-invented-yet-d_a_23030098/

Tennen-Zapier, D. (2020). 4 Ways Remote Work is Better for Women. Retrieved from https://www.fastcompany.com/90477102/4-ways-remote-work-is-better-for-women

Vance, R. J. (2006). Employee Engagement and Commitment. SHRM Foundation's Effective Practice Guidelines, 1-33. https://www.shrm.org/hrtoday/trends-and-forecasting/special-reports-and-expert-views/Documents/EmployeeEngagement-Commitment.pdf

Wilkie, D. (2019). What Are Companies Ending Remote Work? https://www.shrm.org/resourcesandtools/hr-topics/employee-relations/pages/drawbacksto-working-at-home-.aspx

Williams, D. K., & Scott, M. M. (2012). Five Ways to Retain Employees Forever. https://hbr.org/2012/11/five-ways-to-retain-employees

Zaccaro, S., & Bader, P. (2003). E-Leadership and the Challenges of Leading E-Teams: Minimizing the Bad and Maximizing the Good. Science Direct, 31(4), 377-387. http://dx.doi.org/https://doi.org/10.1016/S0090-2616(02)00129-8