Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	23 October 2023
Team ID	Team-592963
Project Name	Smart Home – Temperature Prediction
Maximum Marks	4 Marks
Team Members	P. Sri Naga Varsha S. Guna Sekhar T. Shreyansh

Technical Architecture:

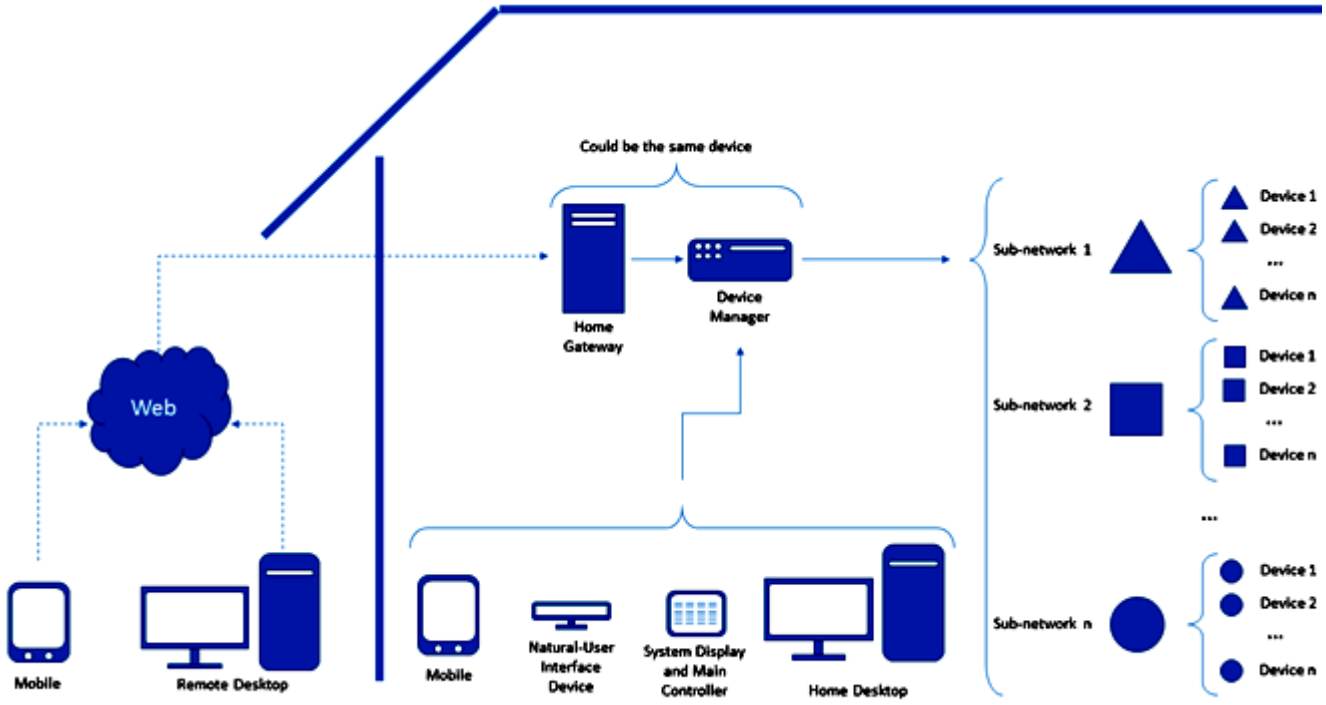

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Smart thermostats	These devices collect data on the current temperature, humidity, and other environmental factors in the home.	Python, Java, C/C++, JavaScript .
2.	Smart motion sensors	These devices detect movement in the home and can be used to infer occupancy and activity levels.	Java / Python
3.	Smart door and window sensors	These devices detect when doors and windows are opened or closed, which can be used to track heat gain or loss.	STT service
4.	Smart weather stations	These devices collect data on the outdoor temperature, humidity, wind speed, and other weather conditions.	Assistant
5.	Cloud computing platform	This provides a scalable and reliable platform for storing, processing, and analyzing the collected data.	Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP)
6.	Machine learning library	This is used to train and deploy machine learning models to predict the future temperature of the home	TensorFlow, PyTorch, scikit-learn

7.	Data pipeline management tool	This is used to automate the process of collecting, processing, and analyzing the data.	Apache Airflow, Luigi, Prefect Filesystem
8.	API	This provides a way for the machine learning model to communicate with other components of the system, such as the smart thermostats.	Flask, Django, RESTful API
9.	Rule engine	This is used to define and execute rules that control the smart thermostats based on the temperature predictions.	Drools, Jess, Node-RED
10.	Dashboard	This provides a way for users to view the temperature predictions and other data related to their home's energy consumption.	Grafana, Kibana, Tableau
11.	Mobile app	This allows users to access the dashboard and control their smart thermostats from anywhere.	Flutter, React Native, Ionic

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Real-time data processing	The system must be able to process data from the smart thermostats, motion sensors, door and window sensors, and weather stations in real time in order to provide accurate temperature predictions.	Streaming data processing frameworks such as Apache Kafka, Apache Spark Streaming, and Flink.

2.	Scalability	The system must be able to scale to a large number of users and devices. This is because the system may be deployed in homes with a variety of different smart devices and with different occupancy patterns.	Cloud computing platforms such as AWS, Azure, and GCP.
3.	Accuracy	The system must be able to predict the future temperature of the home with a high degree of accuracy. This is important because it allows the system to efficiently manage the home's heating and cooling systems.	Machine learning libraries such as TensorFlow, PyTorch, and scikit-learn.

4.	Usability	The system should be easy to use and manage for homeowners. This may involve providing user-friendly dashboards and mobile apps.	Web development frameworks such as Django and Flask, mobile app development frameworks such as Flutter and React Native.
5.	Security	The system should be secure and protect user data from unauthorized access.	Encryption, authentication, and authorization mechanisms
6.	Privacy	The system should respect user privacy and only collect the data necessary to predict the temperature of the home.	Data minimization and anonymization techniques.
7.	Reliability	The system should be reliable and available 24/7.	High availability architectures and fault tolerance mechanisms.
8.	Cost-effectiveness	The system should be cost-effective to implement and maintain	Open source technologies and cloud computing platforms.