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

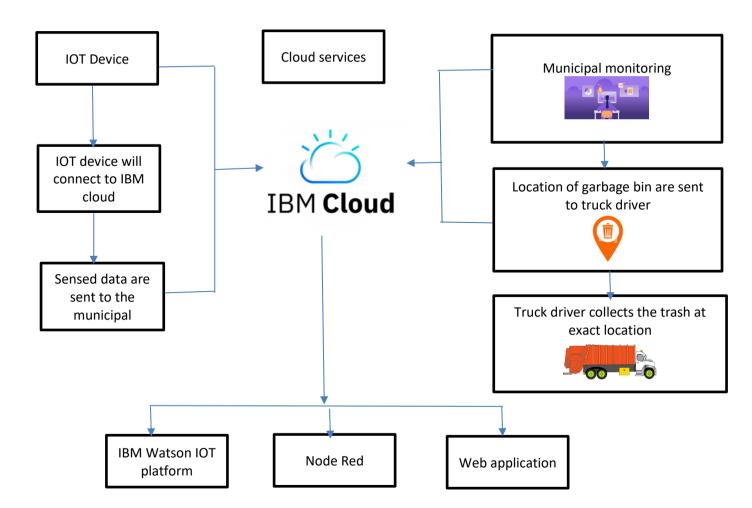| Date	11 November 2022
Team ID	PNT2022TMID04740
Project Name	Project –Smart Waste Management system for Metropolitan cities
Maximum Marks	4 Marks

Technical Architecture:

Table -1: Components & Technologies

S. No	Component	Description	Technology
1.	User Interface	IBM Watson IOT cloud platform	MQTT protocol
2.	Application Logic-1	Status of the bin is monitored by using sensors	Python
3.	Application Logic-2	Data are Monitored by using IOT	IBM Watson STT service
4.	Application Logic-3	Based on the level the bin, message is sent to the trash collectors to clear the Wastes	IBM Watson Assistant
5.	Database	MySQL- It is database to collect the data NoSQL-It is an approach to database design that enables the storage and querying of the data outside the traditional structures found in relational database.	MySQL, NoSQL
6.	Cloud Database	It receives the status of the bin & send the data to the cloud & send it to mobile and web application	IBM DB2, IBM Cloudant
7.	File Storage	It is an easy way to back up and quick recovery to collect the old data.	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	External API is exposing a projects internal resource to the outside users.	IBM Weather API, etc.
9.	External API-2	It is used to allow you to access the third party.	Aadhar API, etc.
10.	Machine Learning Model	It is used to easily identify the location of the bin and find out the shortest path to the bin	Python IDLE, Anaconda navigator or Jupiter.
11.	Infrastructure (Server / Cloud)	**Server** In computing, information technology infrastructure is composed of physical and virtual resources that support the flow, storage, processing and analysis of data. **Cloud** It includes computing power, networking, and storage, as well as an interface for users to access their virtualized resources. **Cloud server configuration** Cloud configuration is the process of setting hardware and software details for elements of a cloud environment to ensure that they can interoperate and communicate.	Cloud - MySQL server-HTTP

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	➢ Real time monitoring system is used in bins and it will notify the fill level and give notification to the receiver in a locality or city at all times. ➢ Ultrasonic sensor is used for measuring the level of waste in the dumpster	Technology of Open-source framework
2.	Security Implementations	➢ Encryption/Decryption used for security purpose ➢ Fundamental component of data security that dictates who's allowed to access and use company information and resources. ➢ Firewalls use a rule-based access control model with rules expressed in an access control list.	GSM/GPRS, Python
3.	Scalable Architecture	➢ New features can be added ➢ 24×7 monitoring system is designed for monitoring dumpsters	Node Red
4.	Availability	➢ We access the data in mobile and web application from anywhere ➢ Any person with authority can access the data easily	IBM Watson I0T Platform, HTML, CSS, JavaScript
5.	Performance	➢ All can access the application at same time. ➢ The Smart Sensors use ultrasound technology to measure the fill levels (along with other data) in bins several times a day	Cloudant DB, IBM Watson IOT Platform