Three Main Cloud Computing Services Available:

* Microsoft Azure: <https://azure.microsoft.com/en-gb/>
* Amazon Web Services: <https://aws.amazon.com/>
* Google Cloud IoT Core: <https://cloud.google.com/iot-core>

All three services offer the same products; however, azure’s products will be easier to implement as they are more commonly used. As the Internet of Things heavily features the use of Azure Cloud, I have a greater understanding of this service compared to the others. Microsoft Azure will be used out of the three services.

Pricing was also considered when decide what cloud service to use. As mentioned above we are using Azure in the Internet of Things module, therefore we have access to Azure though a student membership with $100 credits. Therefore, even though we are implementing free services on Azure any additional expenses that arise will be covered by the student credit. With the other services, we do get a student subscription, therefore will be subjected to standard charges for data storage and functional app creation.

Microsoft Azure is the leading cloud computing service created by Microsoft for building, testing, deploying, and managing applications and services through a Microsoft managed data centre. As the physical servers are manged by the cloud provider, physical maintenance and hardware upgrades are handled by the cloud providers. The data that is stored in the database and future more confidential data will be safe and protected. The physical servers are protected in data centres

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As the application and the device need to communicate with each other, Azure cloud services have been used. The logic apps and functions will allow data to be sent to azure through a POST request. Data from the application such as the bin name and day of collection is saved in a database (cosmos) on the server.

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The cosmos database will store any data received from the application and device in the taskDatabase container. The JSON data is stored on the cloud database and can be retrieved by the device.

Get and Post HTTP request have been used to allow data transfer and the communication of the cloud server, device and application. Get request are used to retrieve data from the server, this can be a device pulling data from the server database. A post request is when the server puts out a request for data, this is usually though a HTTP link. Applications that need data stored in a database, would use POST requests to push the produced data on to the server database. The HTTP link will be used in the application code and automatically push new data or updated data to the server.

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Description automatically generatedTo push the data that was received by the application, which is currently stored in the database, get request have been used. The device will run the get request from the URL link that is provided, on request the data will be shown in json format. This image shows the response from a get request on the server. Database data is then triggered from Cosmos and displayed in the request. The link below is used.

[https://prod-20.ukwest.logic.azure.com:443/workflows/0ffd0f5c472944439ac7f736b3a67e31/triggers/manual/paths/invoke?api-version=2016-10-01&sp=%2Ftriggers%2Fmanual%2Frun&sv=1.0&sig=053uvepKWh\_B08QweJ8DjZJWhkECvyoMlDT5T3LGWvM](https://prod-20.ukwest.logic.azure.com/workflows/0ffd0f5c472944439ac7f736b3a67e31/triggers/manual/paths/invoke?api-version=2016-10-01&sp=%2Ftriggers%2Fmanual%2Frun&sv=1.0&sig=053uvepKWh_B08QweJ8DjZJWhkECvyoMlDT5T3LGWvM)

Azure Functions have been used, as Functions is an event-driven serverless comp platform. Therefore, the physical server setup and maintenance is handled by the cloud provider. So, with Functions, the code and commands were all that need generating. Logic apps were also implemented. These are cloud services that helps to automate and orchestrate tasks, processes and workflows for integrate apps, systems and data.

If the data is sent incorrectly or the user has created an incorrect get request for information, there server will show an error message in the body of the request URL. Here the user is told the error code with the message stating what is incorrect with the request placed. If anything, else apart from the wheelie bin data is sent to the post URL, the server will not accept it and will issue another error message.

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SQL queries are used to query the required data from the Cosmos database.

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