

UCL and IBM AR Avatar Receptionist

Documentation / Deployment Manual

This manual describes how to set up and use our project to create your own Augmented Reality avatar receptionist.

There are four main platforms required to set up the project:

1. Android Device
2. Unity Game Engine
3. IBM Watson Cloud
4. Azure Cloud

To deploy our avatar onto your own device, you only need to follow stages 1 and 2 above. Stages 3 and 4 allow you to see and edit the backend of our avatar to adapt it for your own organisation.

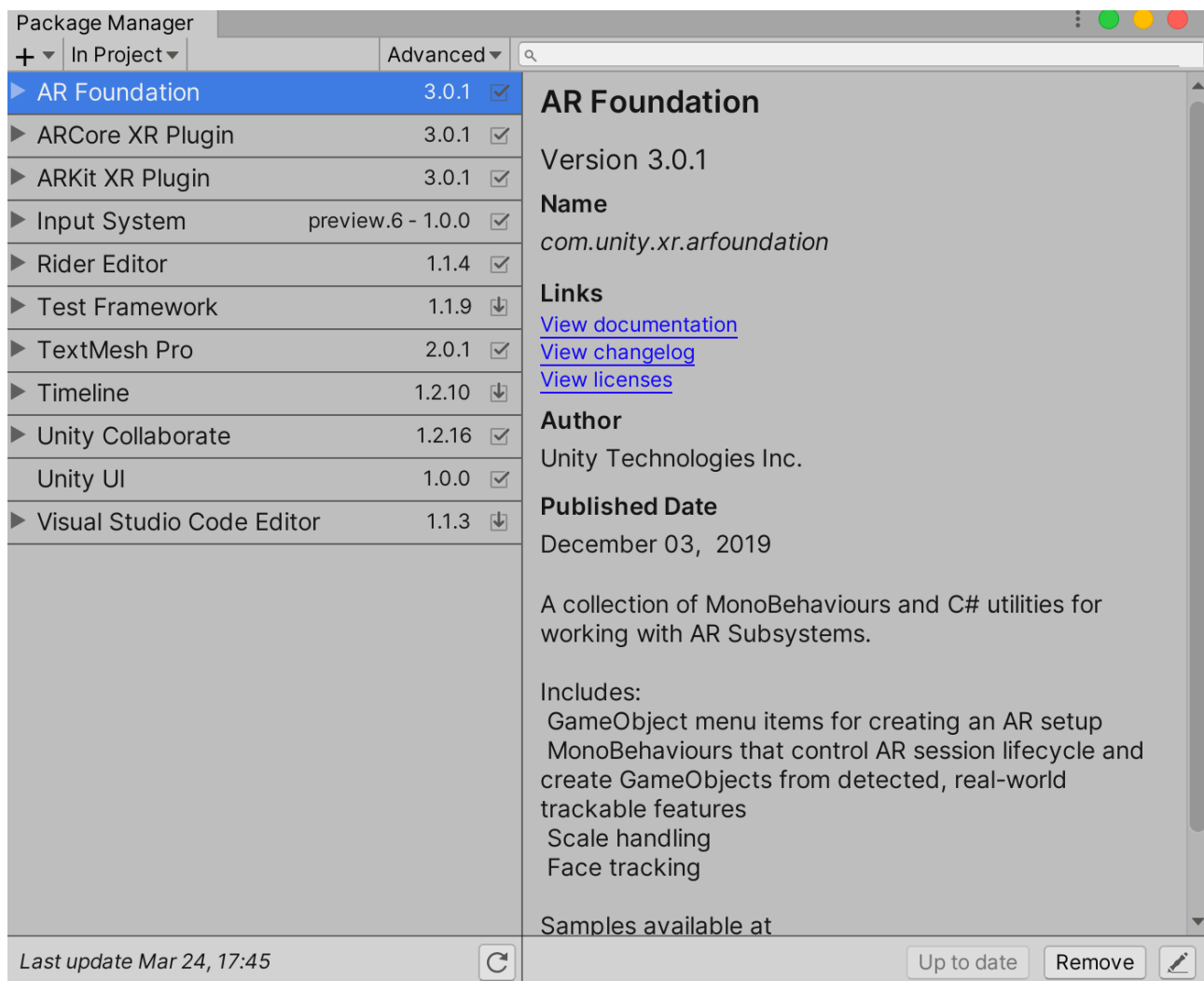
Section 1. Android Device

1. To build the project, you need an ARCore enabled Android device running Android 7.0 (Nougat) or above. To check if your device supports ARCore, please see <https://developers.google.com/ar/discover/supported-devices>
2. You need a cable to connect your device to the computer you intend to work on. When the cable is plugged in, you may need to enable USB Debugging to see console messages displayed in Unity to solve any build errors. See here for steps on how to enable USB debugging here <https://www.getdroidtips.com/enable-usb-debugging/> NB. This will vary from device to device, so you might want to search for your own device specific info.
3. You may need to install “AR Play Store Tools” or a similar package from the Google Play store to enable AR apps to run on your device. Hopefully your phone will prompt you for this when you try to run the app in the next step, but we are aware that it does not do this on some devices.
4. Plug your device into the computer.

Section 2. Unity Game Engine

2.1. Setting Up the Unity Environment.

1. Install and run Unity 2019.3.0f6 on your computer. You can download different Unity versions from the Unity hub which can be downloaded here <https://unity3d.com/get-unity/download>. The project may work on other Unity versions but we have not tested it.
2. Make sure you have installed Android Build Support and Android SDK/OpenJDK when you installed unity. If you don't have these installed, you can install them from the unity hub, see here <https://docs.unity3d.com/Manual/android-sdksetup.html>
3. From Unity or Unity Hub, open the project folder called "12_IBM_Avatar_Receptionist_Unity_Project", making sure it opens in Unity version 2019.3.0f6
4. [Optional Step if you are having problems] The packages that our project requires to run should be installed with the project automatically. If you are having problems with missing packages, check that the following are indeed installed:
 1. From Window > Package Manager > AR Foundation 3.0.1 and ARCore XR 3.0.1 Plugins must be installed. See below for a complete list of packages installed in our project.



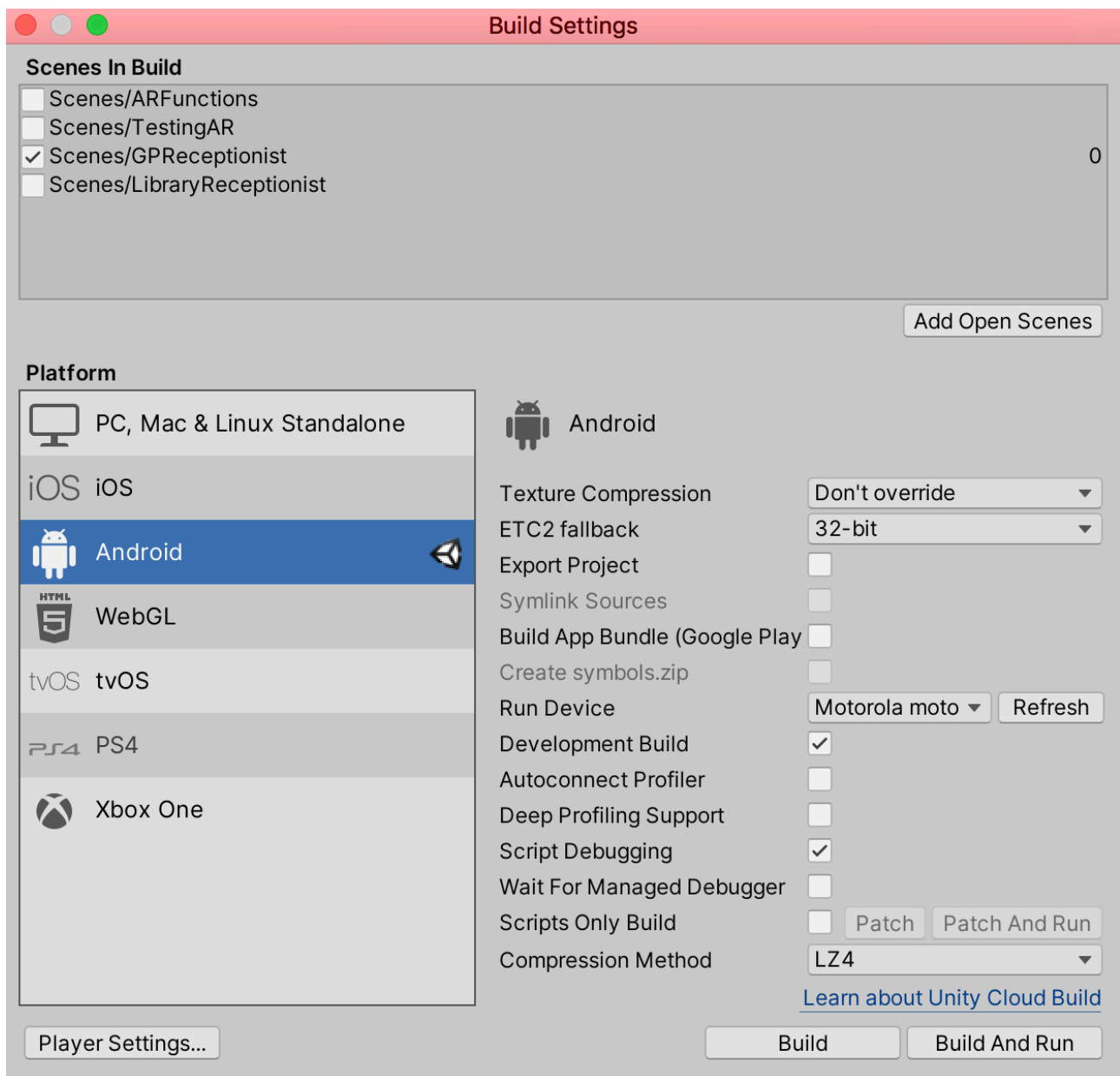
2. NB sometimes we have had issues with the project building in other versions of Visual Studio Code. If you use VSCode as your code editor, make sure it is on Version 1.1.3 and no later
3. In the Assets folder of the project make sure the unity-sdk and unity-sdk-core folders are present. These are the packages needed to connect unity to IBM watson. If not present for any reason, they can be downloaded here, although be aware they may have been changed since we built the project and errors can occur here. <https://github.com/IBM/unity-sdk-core> and <https://github.com/watson-developer-cloud/unity-sdk>
5. Go to File > Build Settings. Select Android, and click “switch platform”.
6. Click on Player settings in the bottom left hand corner. Select the Android tab. Select the arrow next to “Other Settings” to open that section. Check that in the Auto Graphics API list, Vulkan is not appearing, and if it is, delete it.
7. Continuing in player settings, scroll down to Minimum API Level and make sure it says Android 7.0 Nougat (API Level 24), and that the target API level is Automatic (Highest Installed)
8. Continuing in player settings, make sure the Scripting Backend is set to Mono and the API compatibility Level is set to .NET 4.x
9. [Optional] Continuing in player settings, if you wish to enable script debugging to see error messages in the console when running the app, go to Stack Trace and make sure all boxes are checked in the “Full” column
10. Finally, in player settings, open the XR Settings section and make sure ARCore supported is NOT checked.

Section 2.2 Building and Running the app

NB This section assumes a working knowledge of the Unity editor. For full details of the different Unity editor panels, please see <https://docs.unity3d.com/Manual/UsingTheEditor.html>

1. Return to the main unity editor. In the “Project” panel, Select assets > Scenes. Here you will find the scenes to build the different types of receptionist. Double click on the scene corresponding to the receptionist you wish to build. The scene will appear in the editor.
2. In the Hierarchy panel, select AR Session Origin. In the inspector panel, you should now see the AR Session Origin gameObject. In AR Tracked Image Manager (Script), there should be a gameObject appearing in the Tracked Image Prefab field. This is the avatar gameObject that will be instantiated when the camera recognises a tracked image. Double click on this avatar gameObject.
3. Now the avatar gameObject should appear in the Hierarchy and inspector panel. In the Inspector, scroll down to see the New Watson (script). Here you will see fields to enter the IDs and APIKeys to access the Watson services. If you are working from our private package these will be pre-populated, or we will have provided a separate document to you with our API keys. If you are working from the public GitHub repo these credentials have been removed for privacy. Please see section 3, setting up IBM Watson Cloud, to get your own credentials.
4. Enter the provided credentials in the appropriate field. NB for Assistant and Speech to Text, we have found that as the URL it is sufficient to use the base URL for the watson APIs i.e. Watson Assistant URL: <https://gateway-lon.watsonplatform.net/assistant/api> Watson Speech to Text URL: <https://gateway-lon.watsonplatform.net/speech-to-text/api>

5. Open File > Build Settings. Select your android device from the Run Device drop down menu. If you wish to enable script debugging to see error messages in the console, select the checkboxes next to Development Build and next to Script Debugging. Our build settings are shown below.



6. From the Scenes in Build menu, select the scene that you want to build. If it does not appear, select Add Open Scenes.
7. Press build and Run. The app should run on your mobile device. Any build errors will show in the console.
8. If you wish to see script debugging, In the Console panel in the Unity Editor select the device you are using from the "Editor" drop down menu.

Section 3. IBM Watson Cloud

The below explains how to use IBM Watson Cloud to edit the backend of our avatar.

Section 3.1 Setting up Watson Cloud using our provided account

1. Go to <https://cloud.ibm.com/login> and login with the credentials provided to you in the private documentation)
2. From the Dashboard, click on Services
3. From the Services section of the Resource List, click on Watson Assistant Test. Check that the status column shows a green circle saying "Active". [If it is not active, this may be because the account has been deactivated or has run out of credit. Contact IBM in this case]
4. On this page, you can see the Credentials at the bottom of the page. Click on "show credentials" to reveal the API key. This is what needs to be entered into the Assistant API Key field of the avatar in the Unity editor. (see, section 2.2 steps 3 and 4)
5. Click on "Launch Watson Assistant"
6. You should see the list of assistants associated with this service instance, including GPAssistant, MuseumLibraryAssistant and OfficeReceptionistAssistant. Click on the assistant you would like to use.
7. Under Dialog, click on the skill box to launch the dialog skill.
8. You are now in the Assistant Dialog Editor. Here you can edited the recognised Intents, Entities and Dialog nodes of the assistant. For an explainer of these terms and how assistant works, please see <https://developer.ibm.com/technologies/artificial-intelligence/articles/introduction-watson-assistant>
9. Click on Try It in the top right hand corner to test the chatbot.

Section 3.2 Setting up Watson Cloud without our provided account

If you do not have access to our IBM account, you can connect the chatbot to your own IBM Watson backend.

1. Create an IBM Cloud account. <https://cloud.ibm.com/registration>
2. We recommend following these IBM tutorials to set up an instance of IBM Watson Assistant in the IBM Watson Cloud. Once you have done so and got to grips with the interface (including what Intents, Entities and Dialog nodes are) you can move on to the next step. <https://developer.ibm.com/tutorials/create-your-first-assistant-powered-chatbot/>
3. Go to the Watson Assistant homepage, and click, Create Assistant. Name your assistant and click create.
4. Click on the Add Dialog Skill button. Select the Import Skill tab.
5. Upload the provided JSON file for the type of assistant that you would like to build. Click Import
6. You will now see the skill in the Dialog section of your chatbot. Click on the skill to edit it.
7. You can now edit the recognised Intents, Entities and Dialog to adapt the chatbot to your organisation. You might, for example, like to change the text in the “Help” or “FirstMessage” dialog nodes to say more specific information to your organisation.
8. You will probably want to change the “Entities” to be more specific to your organisation - for example, if you are using the GP chatbot, you will want to add the names of your doctors here. You can import entities using csv files.
9. Go to the “Options” tab and click on “Webhooks” to see the settings for your webhook. If you want to link with our database backend, you will need to set up your Azure Function webhook and then insert the details for it here, so that Watson Assistant can interface with it.
10. To get the credentials for your chatbot to insert into the avatar credentials slots in Unity, return to the assistant homepage. In the top right hand corner of the assistant that you wish to connect to, click on the three dots. Then click Settings. In Settings, click the API details tab. Here you will see the AssistantID and Api Key fields which you will need to insert into the avatar script in Unity [See section 2 above].

Section 4. Azure Cloud

4.1 Setting up a Function App

1. Go to <https://portal.azure.com/> , create an account and log in
2. In Azure services, click create a resource, and on the next screen click Function App
3. Choose a subscription to use and resource group. These may need to be created if they aren't pre-existing. Give the Function App a name, and choose 'Code', '.NET Core' and 3.1 for Publish, Runtime Stack and Version, and select the appropriate region.

Microsoft Azure

Home > New > Function App

Function App

Basics Hosting Monitoring Tags Review + create

Create a function app, which lets you group functions as a logical unit for easier management, deployment and sharing of resources. Functions lets you execute your code in a serverless environment without having to first create a VM or publish a web application.

Project Details

Select a subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Resource Group * [Create new](#)

Instance Details

Function App name * .azurewebsites.net

Publish * ☐ Code ☐ Docker Container

Runtime stack *

Version *

Region *

4. On the next page, choose or create a new storage account and select Windows as the OS. We chose Consumption (Serverless) for the plan type.

Function App

Basics **Hosting** Monitoring Tags Review + create

Storage

When creating a function app, you must create or link to a general-purpose Azure Storage account that supports Blobs, Queue, and Table storage.

Storage account * [Create new](#)

Operating system

The Operating System has been recommended for you based on your selection of runtime stack.

Operating System * ☐ Linux ☒ Windows

Plan

The plan you choose dictates how your app scales, what features are enabled, and how it is priced. [Learn more](#)

Plan type *

5. The monitoring and tags pages can be left with their default values. Go to review, and click create, and wait for the deployment to finish.

WatsonInterfaceTest

Function App

Overview Platform features

Stop Restart Get publish profile Reset publish profile Download app content Delete

Status: Running

Subscription: Microsoft Azure Sponsorship 2 Resource group: COMPO16Team12 URL: https://watsoninterface-test.azurewebsites.net

Subscription ID: e2595d8e-4169-4b36-b912-e10f6d71c521 Location: Central US App Service plan / pricing tier: ASP-COMPO16Team12-0000 (Consumption)

Configured features

- Function app settings
- Configuration
- Application Insights

You have created a function app!
Now it is time to add your code...

+ New function

6. Once deployment has finished; the function app has been created and it will prompt to add a new function. Instead, navigate to <https://<your function app name>.scm.azurewebsites.net/ZipDeployUI> and drag the provided zip into the file explorer on the page. This will take a minute or so, and then

say Deployment successful below. More detailed instructions on this step can be found here: <https://docs.microsoft.com/en-us/azure/app-service/deploy-zip>

7. Navigate back to the function app page, and refresh if you kept the page open, and after a moment the HttpTrigger1 will appear in the functions section, along with all the original code.

8. Open the HttpTrigger1 function, and open the console (at the left and bottom of the screen respectively). Enter the commands 'dotnet add package Twilio', 'dotnet restore' and 'dotnet build', and when that's finished stop and start the function.

9. Finally, the Application settings need to be added. To do this, go to the main page for the function app and click 'configuration'. Click 'advanced edit' and paste in the contents of applicationsettings.txt after the first '{'.

N.B. when trying to set it up from scratch, there were occasionally errors such as issues loading a .dll, this never occurred on our main project and it is unclear how to resolve it.

4.2 Setting up an SQL database

1. As with the function app, go to the portal home page, select create a resource and this time choose SQL database

2. Choose the subscription, resource group and a name. Configure the compute + storage to suit needs and budget

Configure

Feedback

Looking for basic, standard, premium?

General Purpose
Suitable for most workloads and storage options
100, 200, 400, 800, 1600 vCores
2 TB to 16 TB Memory

Hyperscale
On-demand scalable storage
100, 200, 400, 800, 1600 vCores
1 TB to 16 TB Memory

Business Critical
High availability with high performance
100, 200, 400, 800, 1600 vCores
1 TB to 16 TB Memory

Compute Size

Provisioned
Compute resources are pre-allocated
Billed per hour based on vCores configured

Serverless
Compute resources are auto-scaled
Billed per second based on vCores used

Compute Hardware
Click "Change configuration" to see details for all hardware generations available including memory optimized and compute optimized options
Hardware Configuration: **Basic**
Up to 16 vCores, up to 16 TB memory
[Change configuration](#)

Scale Memory
Set up to 16 TB with a memory you already own, already have a SQL Server license? [Learn more](#)
☐ Yes ☒ No
vCores: [View the vCores available with this size](#)
1 2 4 8 16 32 64 128 256 512 1024 2048 4096 8192 16384 32768 65536 131072 262144 524288 1048576 2097152 4194304 8388608 16777216 33554432 67108864 134217728 268435456 536870912 1073741824 2147483648 4294967296 8589934592 17179869184 34359738368 68719476736 137438953472 274877906944 549755813888 1099511627776 2199023255552 4398046511104 8796093022208 17592186044416 35184372088832 70368744177664 140737488355328 281474976710656 562949953421312 1125899906842624 2251799813685248 4503599627370496 9007199254740992 18014398509481984 36028797018963968 72057594037927936 144115188075855872 288230376151711744 576460752303423488 1152921504606846976 2305843009213693952 4611686018427387904 9223372036854775808 18446744073709551616 36893488147419103232 73786976294838206464 147573952589676412928 295147905179352825856 590295810358705651712 1180591620717411303424 2361183241434822606848 4722366482869645213696 9444732965739290427392 18889465931478580854784 37778931862957161709568 75557863725914323419136 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HasBeenDelivered bit,

ExpectedDate DateTime

);

6. On the menu down the left of the screen, scroll down to the settings section and click on 'Connection strings'. Copy the text in the box, and then in the configuration page for the function app edit the sqldb_connection value to be the connection string for the new SQL database.

7. The database can be populated with data from the query editor using SQL queries or the edit data feature (currently in preview), which can be selected after clicking the 3 dots next to the table name

4.3 Adapting the webhook to a new business. There are 3 main levels at which the webhook can be adapted:

1. The simplest way is to have different data in the SQL database. This can be achieved simply through SQL queries, or the graphical user interface available on Azure, to create records with information personalised for the new business
2. Secondly, the application settings can be altered. Having set sqldb_connection to the connection string of the new database, the Twilio* authToken and accountSid can be entered, along with a default number to text if human assistance is needed. After this, the request_types can be replaced with the table names being used for each request type, and the valid key names strings can be edited to include different or new column names which can be selected or compared to.

*To get the Twilio credentials, create an account here: <https://www.twilio.com/try-twilio> . It will also be necessary to change the from number in the code at line 164 if the number for your account is different.

3. Finally, with access to the code the existing request types can be edited, and new request types can be added. They generally follow the format of getting the valid key names from one of the application variables, making a query with makeQuery(false, "") if using all of the keys from the HTTP request, and returning the result of databaseRequest with the query string as a parameter. There are variations on the query making method, including more specific ones like allEventsOnDay() and OrganisationInfoQuery(), and SetQuery() for updating the table.