



AZR110

Building an Azure Mobile App Service

Download class materials from
university.xamarin.com



Xamarin University

Information in this document is subject to change without notice. The example companies, organizations, products, people, and events depicted herein are fictitious. No association with any real company, organization, product, person or event is intended or should be inferred. Complying with all applicable copyright laws is the responsibility of the user.

Microsoft or Xamarin may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any license agreement from Microsoft or Xamarin, the furnishing of this document does not give you any license to these patents, trademarks, or other intellectual property.

© 2014-2017 Xamarin Inc., Microsoft. All rights reserved.

Xamarin, MonoTouch, MonoDroid, Xamarin.iOS, Xamarin.Android, Xamarin Studio, and Visual Studio are either registered trademarks or trademarks of Microsoft in the U.S.A. and/or other countries.

Other product and company names herein may be the trademarks of their respective owners.



Objectives

1. Create the mobile app service
2. Add a database to your back end

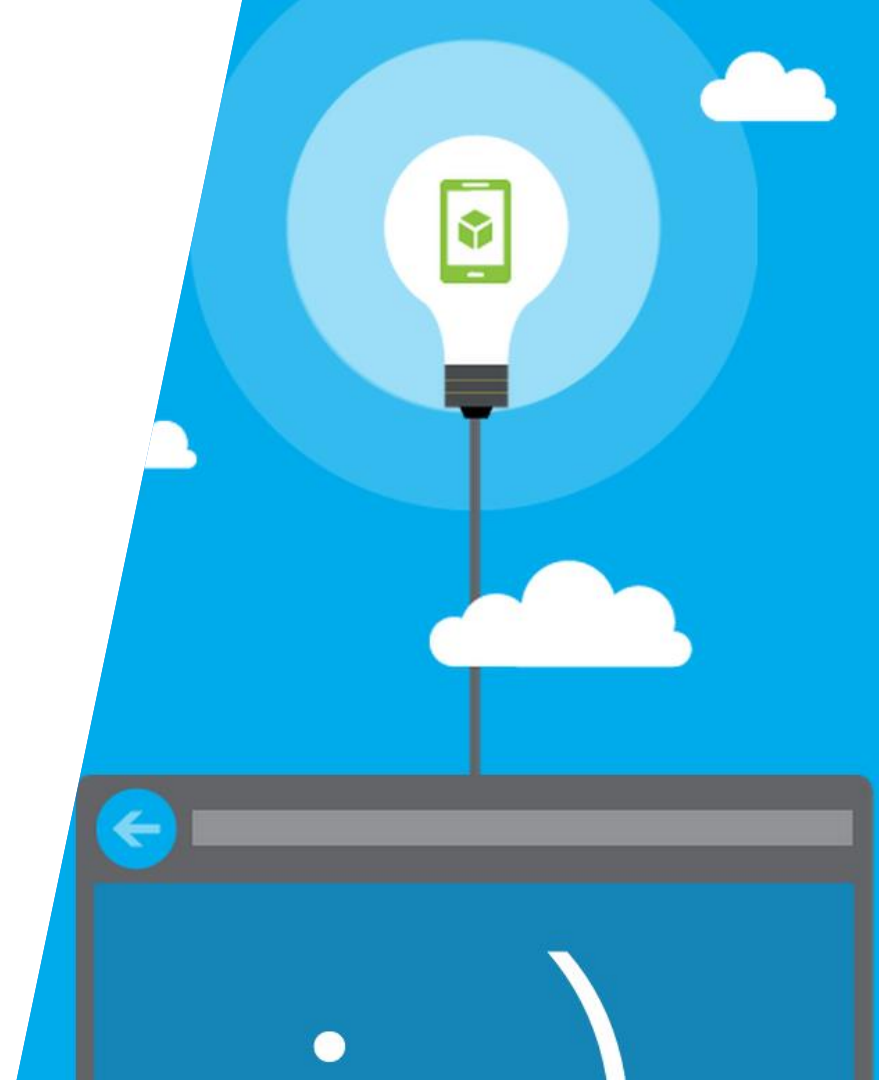




Create the mobile app service

Tasks

1. Explore the mobile features provided by Azure App Services
2. Create a new Mobile app in the Azure Management portal
3. Create a new Mobile app in Visual Studio
4. Setup deployment publishing



Reminder: Azure Apps

- ❖ Azure App Services is a PaaS offering for web, mobile and integration scenarios



Web App

Used to create a hosted IIS-based website



Function App

Server-side scheduled jobs



Mobile App

WebAPI + data app for apps using Mobile Client SDK



API App

Used to create a hosted RESTful web service



Logic App

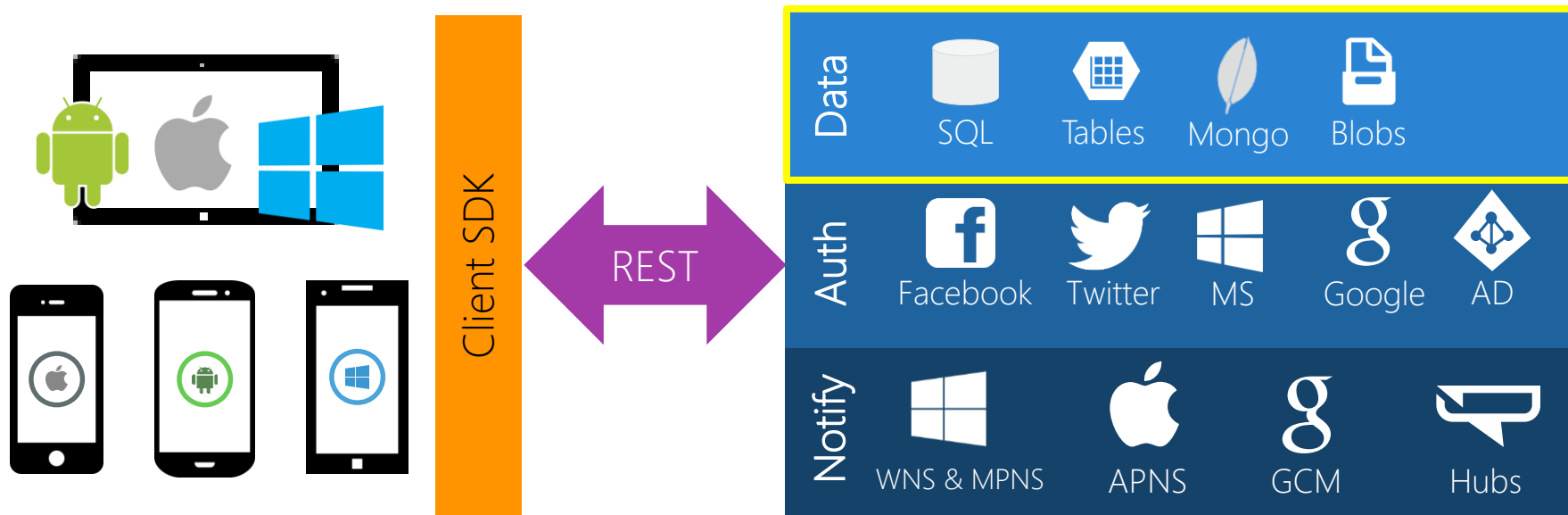
Workflow integration with data conversion + logic



Could also use **API App** and access the service using the techniques shown in **XAM150**

Features of an Azure Mobile app

- ❖ Azure Mobile App provides a set of pre-built services you can activate for your mobile app; exposed using web service endpoints



Implementing the back-end service

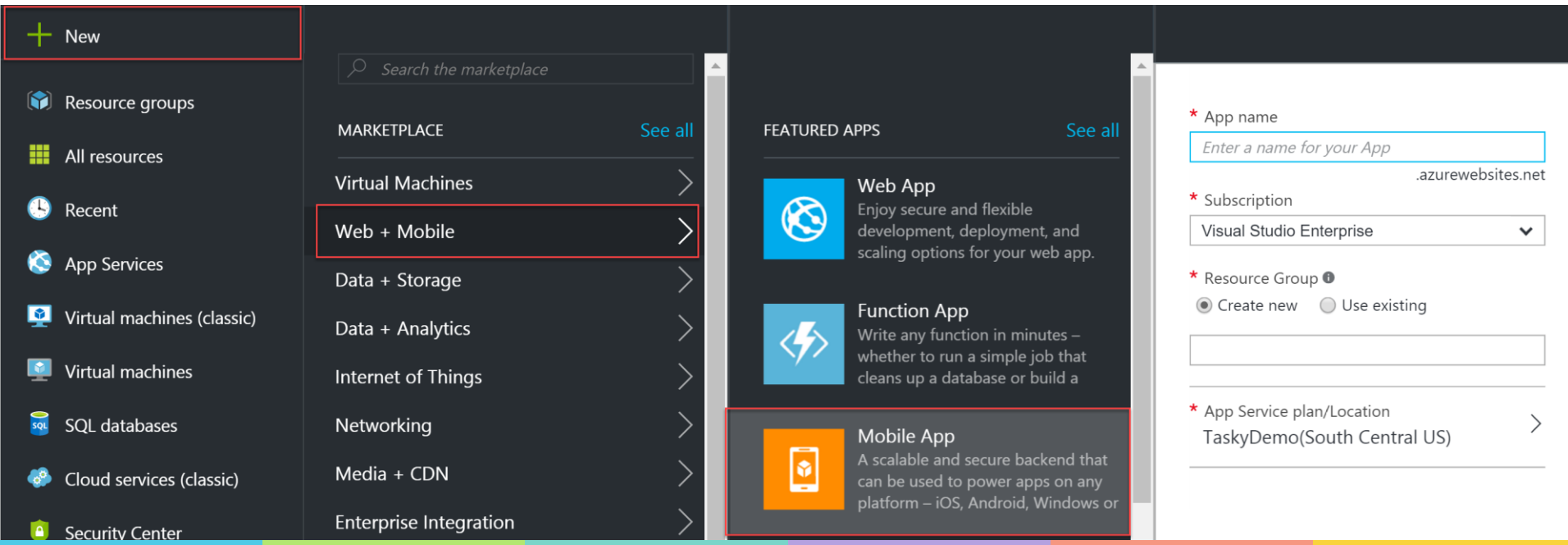
- ❖ Azure App services support two back-end technologies on top of IIS, can use either one to define your service code



Uses JavaScript to define and customize server endpoints and point-and-click creation but lacks type safety - This is the default when you use the portal to create your app

Recall: creating an app in the portal

- ❖ Create a new Mobile App using the template under **Web + Mobile** in the management portal (<https://portal.azure.com>)



The screenshot displays the Azure portal interface. On the left sidebar, the 'New' button is highlighted with a red box. The main area shows the 'MARKETPLACE' section with a search bar and a list of categories. The 'Web + Mobile' category is highlighted with a red box. To the right, the 'FEATURED APPS' section shows three options: 'Web App', 'Function App', and 'Mobile App'. The 'Mobile App' option is highlighted with a red box. On the far right, a form for creating a new app is visible, with fields for 'App name', 'Subscription', 'Resource Group', and 'App Service plan/Location'.

Left Sidebar (Navigation):

- + New
- Resource groups
- All resources
- Recent
- App Services
- Virtual machines (classic)
- Virtual machines
- SQL databases
- Cloud services (classic)
- Security Center

MARKETPLACE (Search the marketplace)

- Virtual Machines
- Web + Mobile**
- Data + Storage
- Data + Analytics
- Internet of Things
- Networking
- Media + CDN
- Enterprise Integration

FEATURED APPS

- Web App**
Enjoy secure and flexible development, deployment, and scaling options for your web app.
- Function App**
Write any function in minutes – whether to run a simple job that cleans up a database or build a
- Mobile App**
A scalable and secure backend that can be used to power apps on any platform – iOS, Android, Windows or

Form Fields:

- * App name: Enter a name for your App (azurewebsites.net)
- * Subscription: Visual Studio Enterprise
- * Resource Group: Create new (selected) / Use existing
- * App Service plan/Location: TaskyDemo(South Central US)

Defining the app

Mobile App

— □ ×

* App name

Enter a name for your App
 .azurewebsites.net



Must supply a **globally unique name** to create the public URL

* Subscription

Visual Studio Enterprise ▼



Select Azure billing subscription to use

* Resource Group ⓘ

☒ Create new ☐ Use existing



Should create a new resource group to tie all the app elements together; can also use an existing group

* App Service plan/Location

TaskyDemo(South Central US) >



Must select the service tier and regional location where service will be hosted; can change service plan as you shift from development > production

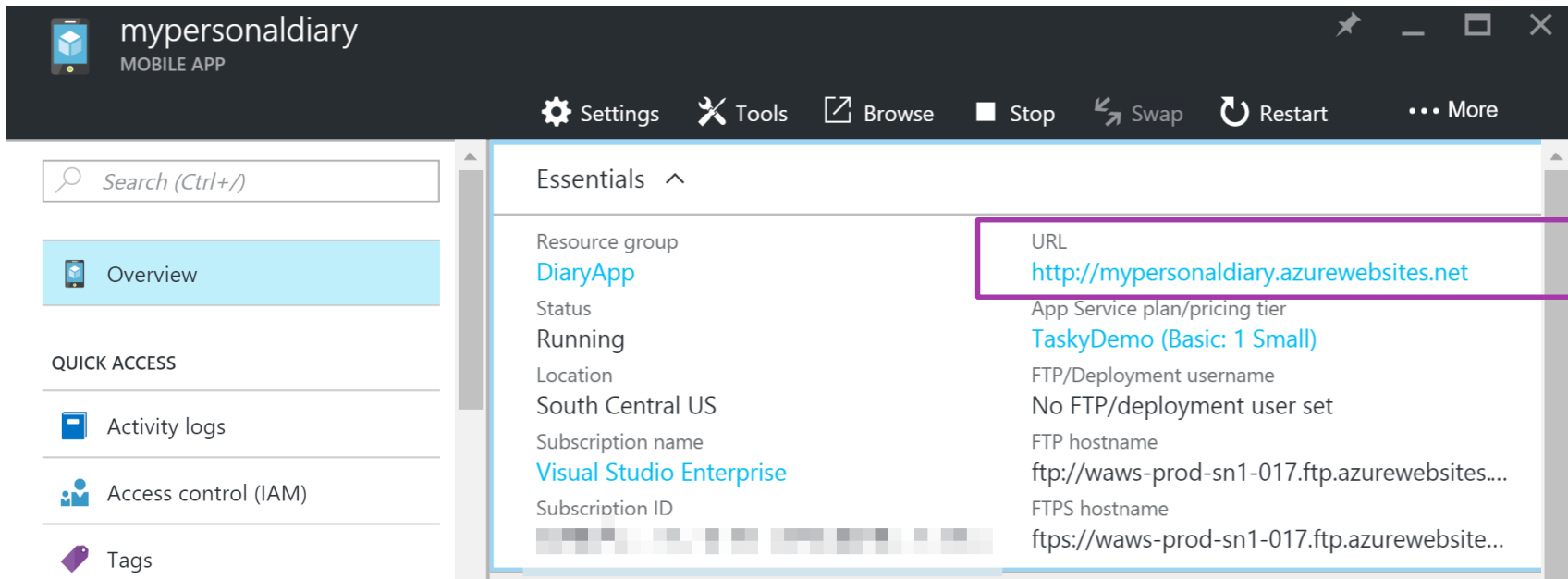
☐ Pin to dashboard

Create

Automation options

Getting the mobile URL

- ❖ Once created, the mobile app dashboard will display URL information needed to connect the mobile app to the service



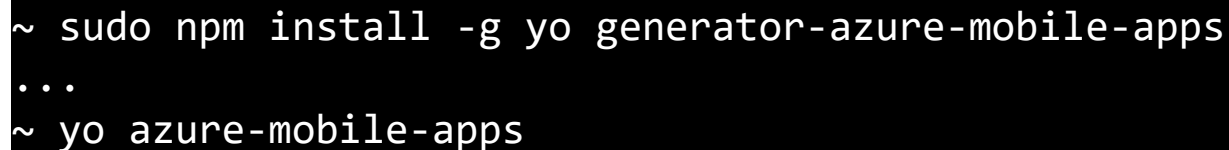
The screenshot shows the Xamarin mobile app dashboard for a project named 'mypersonaldiary'. The dashboard is divided into a left sidebar and a main content area. The sidebar includes a search bar, an 'Overview' tab, and a 'QUICK ACCESS' section with links to 'Activity logs', 'Access control (IAM)', and 'Tags'. The main content area displays the 'Essentials' section, which lists various app details. A purple box highlights the 'URL' field, which contains the text 'http://mypersonaldiary.azurewebsites.net'.

Essentials	
Resource group	URL
DiaryApp	http://mypersonaldiary.azurewebsites.net
Status	App Service plan/pricing tier
Running	TaskDemo (Basic: 1 Small)
Location	FTP/Deployment username
South Central US	No FTP/deployment user set
Subscription name	FTP hostname
Visual Studio Enterprise	ftp://waws-prod-sn1-017.ftp.azurewebsites....
Subscription ID	FTPS hostname
	ftps://waws-prod-sn1-017.ftp.azurewebsite...

Creating a node.js back end with CLI

- ❖ Can also generate a **node.js** back end on your *local machine* from the command line using Yeoman and then publish to Azure

Install the generator (macOS / Linux / WinBash)



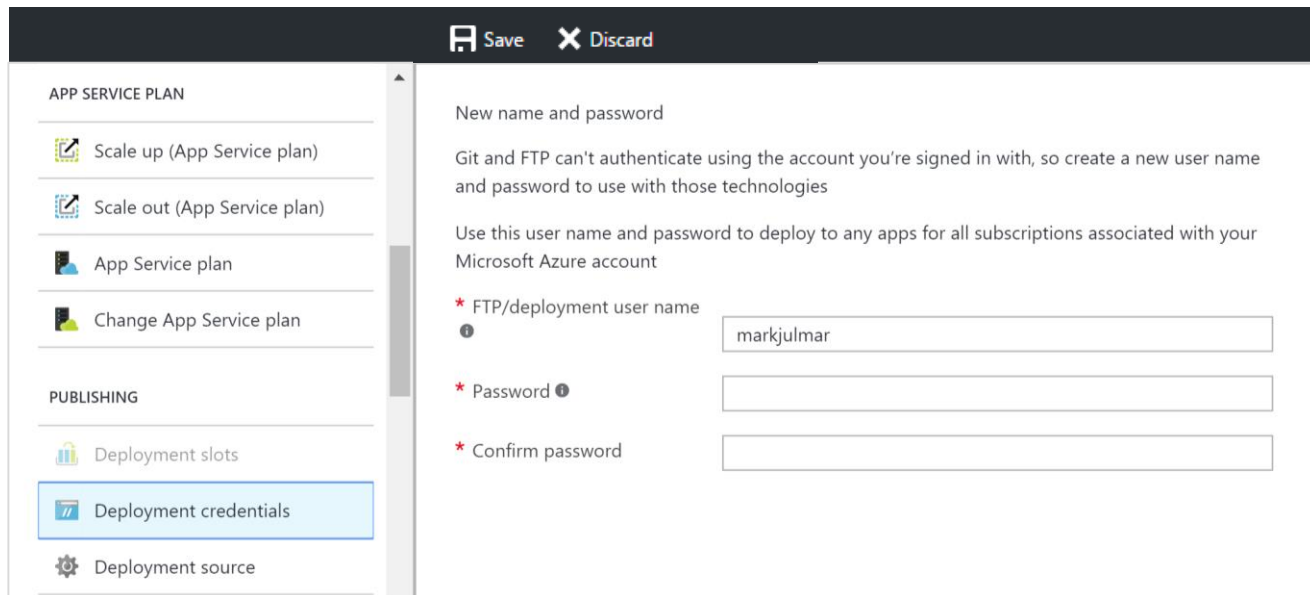
```
~ sudo npm install -g yo generator-azure-mobile-apps
...
~ yo azure-mobile-apps
```

The terminal screenshot is enclosed in a black box. A purple arrow points from the text 'Install the generator...' above to the first command in the terminal. Another purple arrow points from the text 'Generate a new Azure mobile app...' below to the second command in the terminal.

Generate a new Azure mobile app in the current folder – can then upload into Azure using FTP or publishing deployment

Manually publishing to Azure (FTP)

- ❖ Can manually publish service using FTP; credentials can be set in the **Publishing** settings of your app portal and URL is available from dashboard



The screenshot shows the 'Deployment credentials' settings page in the Azure App Service portal. The left sidebar contains a navigation menu with the following items: 'APP SERVICE PLAN' (with sub-items: 'Scale up (App Service plan)', 'Scale out (App Service plan)', 'App Service plan', and 'Change App Service plan)'), 'PUBLISHING' (with sub-items: 'Deployment slots', 'Deployment credentials' (highlighted), and 'Deployment source'), and 'Deployment source'. The main content area has a dark header with 'Save' and 'Discard' buttons. Below the header, the section is titled 'New name and password'. It contains the following text: 'Git and FTP can't authenticate using the account you're signed in with, so create a new user name and password to use with those technologies' and 'Use this user name and password to deploy to any apps for all subscriptions associated with your Microsoft Azure account'. There are three required fields: 'FTP/deployment user name' (with a value of 'markjulmar'), 'Password', and 'Confirm password'.

Save Discard

APP SERVICE PLAN

- Scale up (App Service plan)
- Scale out (App Service plan)
- App Service plan
- Change App Service plan

PUBLISHING

- Deployment slots
- Deployment credentials
- Deployment source

New name and password

Git and FTP can't authenticate using the account you're signed in with, so create a new user name and password to use with those technologies

Use this user name and password to deploy to any apps for all subscriptions associated with your Microsoft Azure account

* FTP/deployment user name

* Password

* Confirm password

Manually publishing to Azure (FTP)

- ❖ Can manually publish service using FTP; credentials can be set in the **Publishing** settings of your app portal and URL is available from dashboard

URL

<http://taskydemo.azurewebsites.net>

App Service plan/pricing tier

TaskyDemo (Basic: 1 Small)

FTP/Deployment username

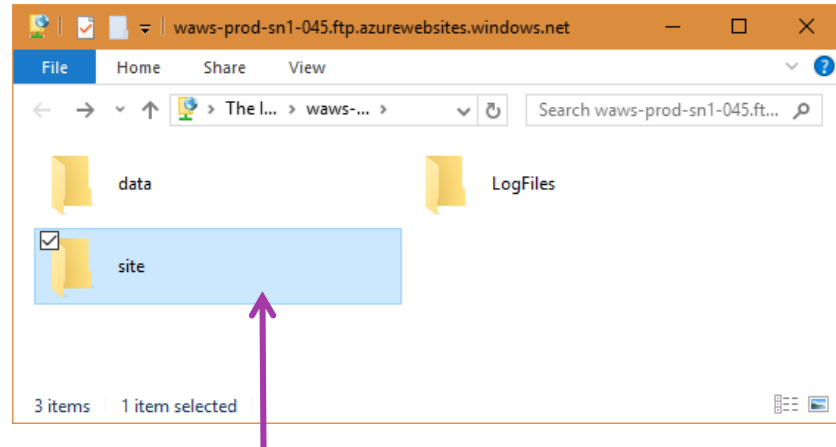
TaskyDemo\markjulmar

FTP hostname

ftp://waws-prod-sn1-017.ftp.azurewebsites....

FTPS hostname

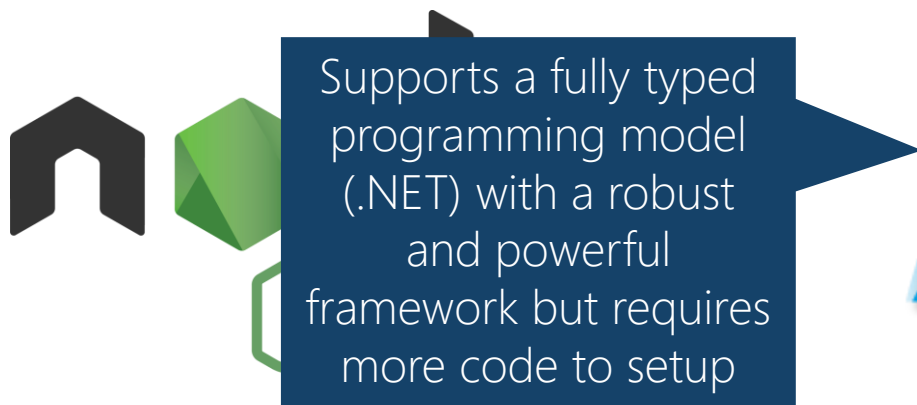
ftps://waws-prod-sn1-017.ftp.azurewebsite...



Web server files must be placed
into the **/site/wwwroot** folder

Implementing the back-end service

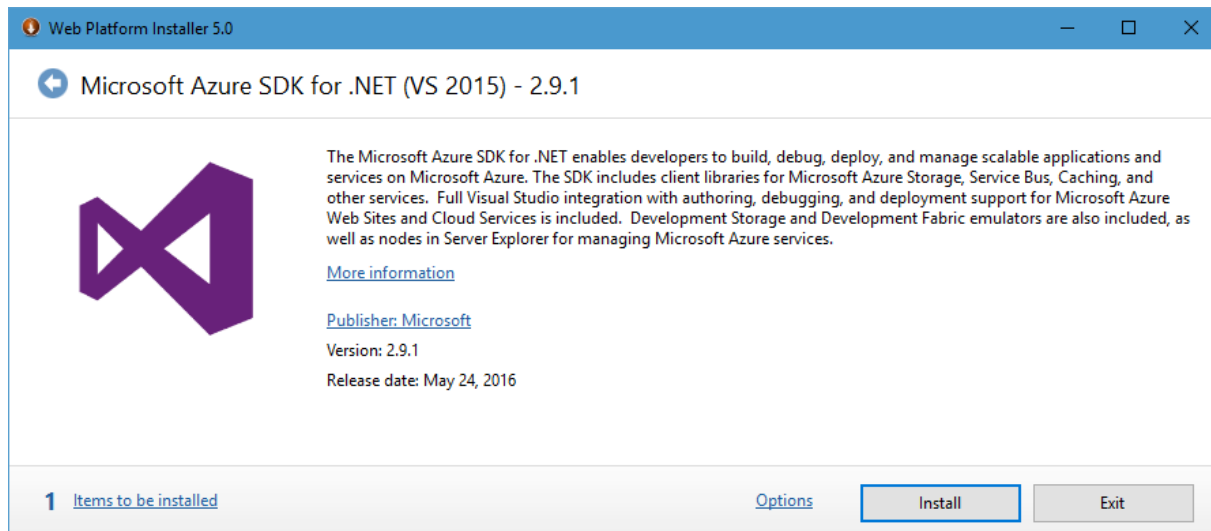
- ❖ Azure App services support two back-end technologies on top of IIS, can use either one to define your service code



ASP .NET

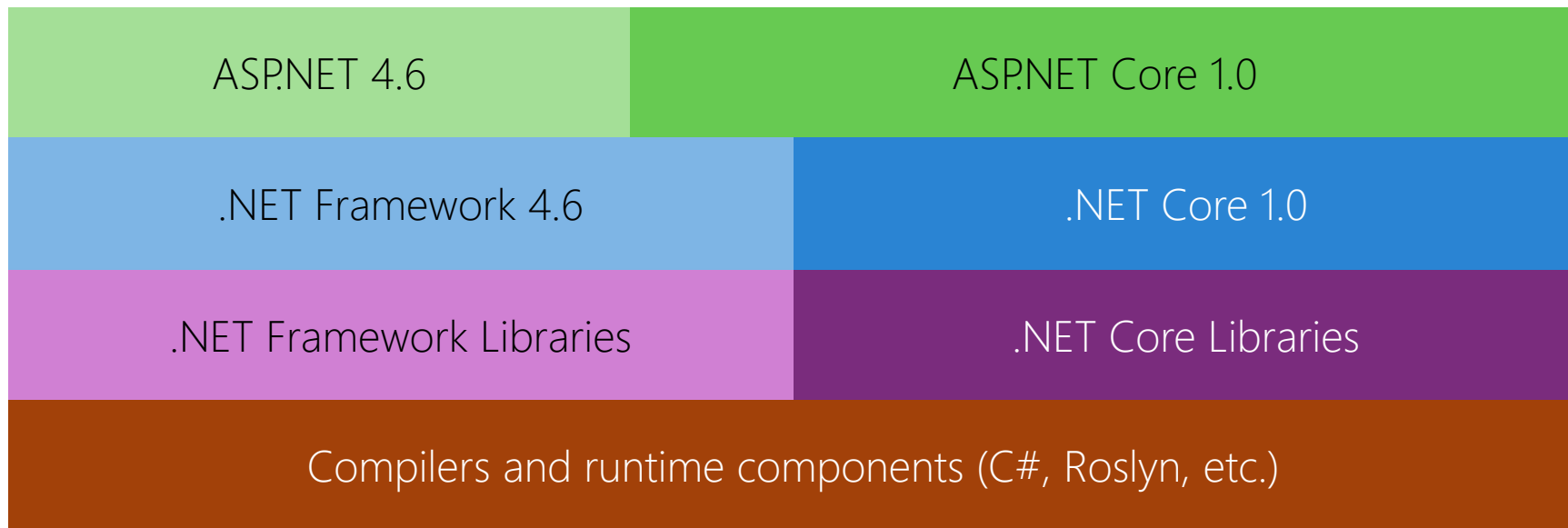
Install the Azure SDK for VS

- ❖ Must install the Azure SDK for .NET for Visual Studio from azure.microsoft.com/downloads to get the components, templates and simulators for Azure



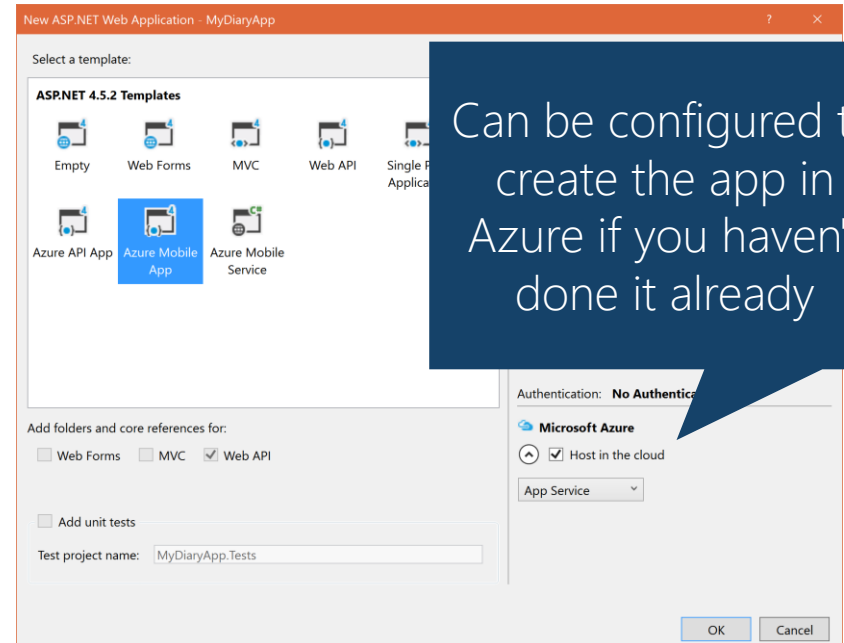
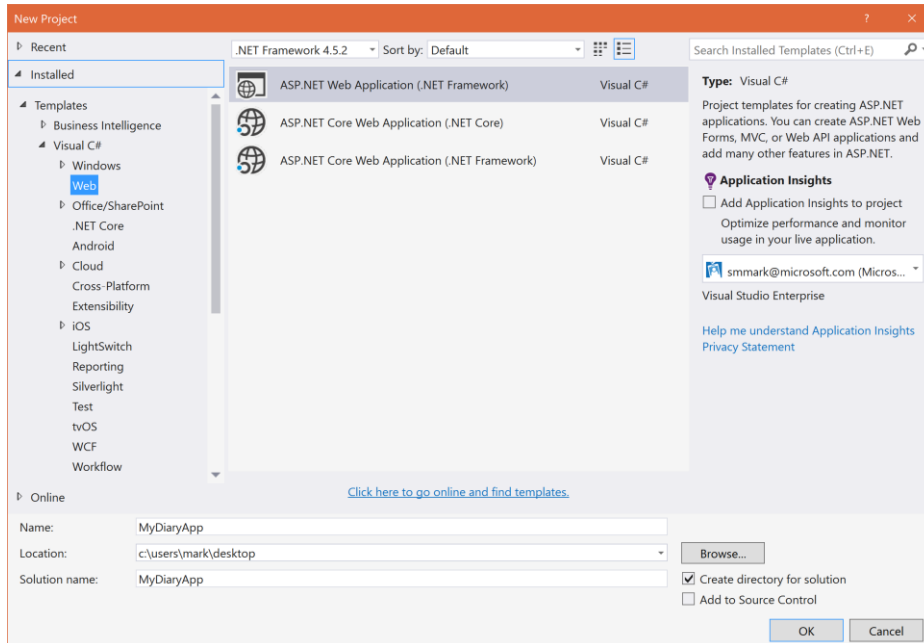
.NET Platforms

- ❖ Service back end can be built on top of traditional ASP.NET or on the newer **ASP.NET Core** platform



Creating an Azure App service in .NET

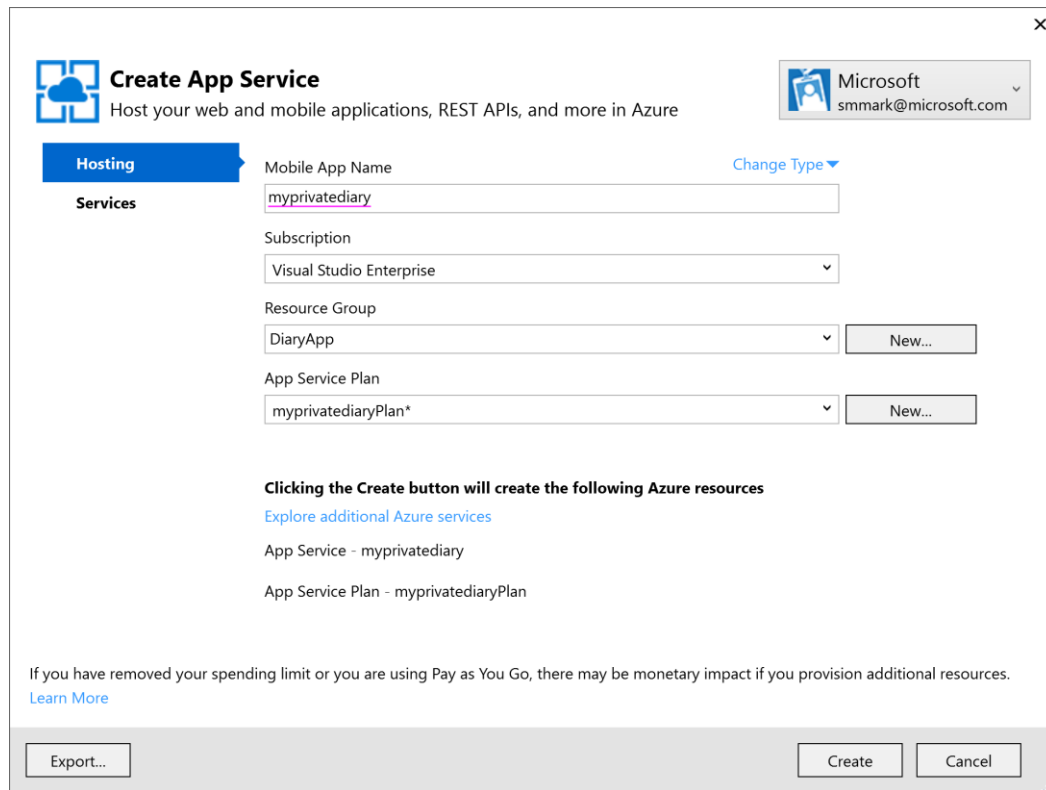
❖ Use the **Azure Mobile App** template to create a web service in VS



Can be configured to create the app in Azure if you haven't done it already

Defining the Azure app in VS

- ❖ When VS creates the app, it lets you set all the same options found in the Azure portal wizard
- ❖ Adds web deployment record to the solution to let you manually publish to Azure with **Build > Publish** menu option



The screenshot shows the 'Create App Service' wizard in Visual Studio. The title bar says 'Create App Service' with a subtitle 'Host your web and mobile applications, REST APIs, and more in Azure'. The Microsoft account 'smmark@microsoft.com' is shown in the top right. The 'Hosting' tab is selected, and the 'Services' section is active. The 'Mobile App Name' field contains 'myprivatediary'. The 'Subscription' dropdown is set to 'Visual Studio Enterprise'. The 'Resource Group' dropdown is set to 'DiaryApp', with a 'New...' button next to it. The 'App Service Plan' dropdown is set to 'myprivatediaryPlan*', also with a 'New...' button. Below these fields, a message states: 'Clicking the Create button will create the following Azure resources'. It lists 'App Service - myprivatediary' and 'App Service Plan - myprivatediaryPlan*'. A link 'Explore additional Azure services' is provided. At the bottom, a disclaimer mentions potential monetary impact if spending limits are removed or Pay as You Go is used, with a 'Learn More' link. The bottom bar contains 'Export...', 'Create', and 'Cancel' buttons.

Create App Service
Host your web and mobile applications, REST APIs, and more in Azure

Microsoft
smmark@microsoft.com

Hosting
Services

Mobile App Name: [Change Type ▾](#)

Subscription: ▾

Resource Group: ▾

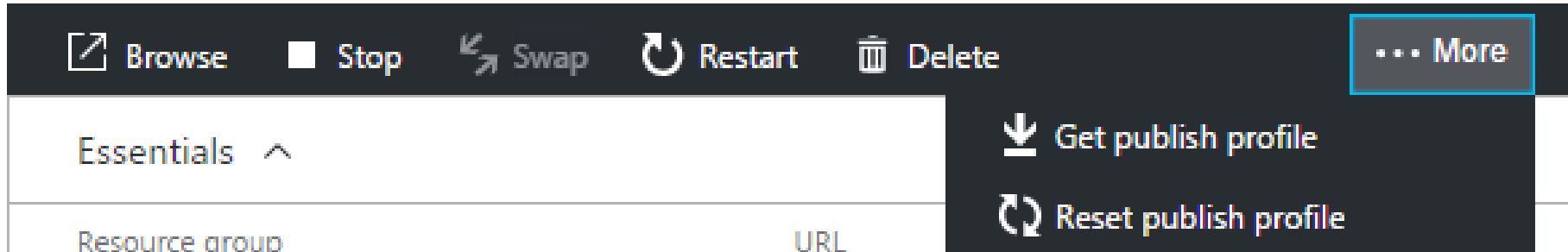
App Service Plan: ▾

Clicking the Create button will create the following Azure resources
[Explore additional Azure services](#)
App Service - myprivatediary
App Service Plan - myprivatediaryPlan*

If you have removed your spending limit or you are using Pay as You Go, there may be monetary impact if you provision additional resources.
[Learn More](#)

Resetting the publishing credentials

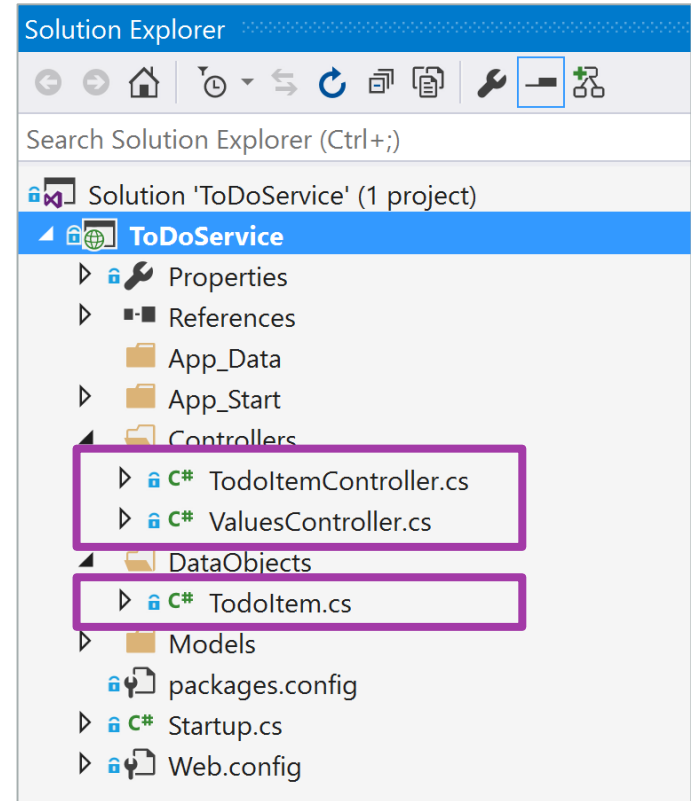
- ❖ Can download or reset the publishing profile used by WebDeploy through the **More** menu in the app portal



Beware: passwords in the downloaded publishing profile are stored in clear text!

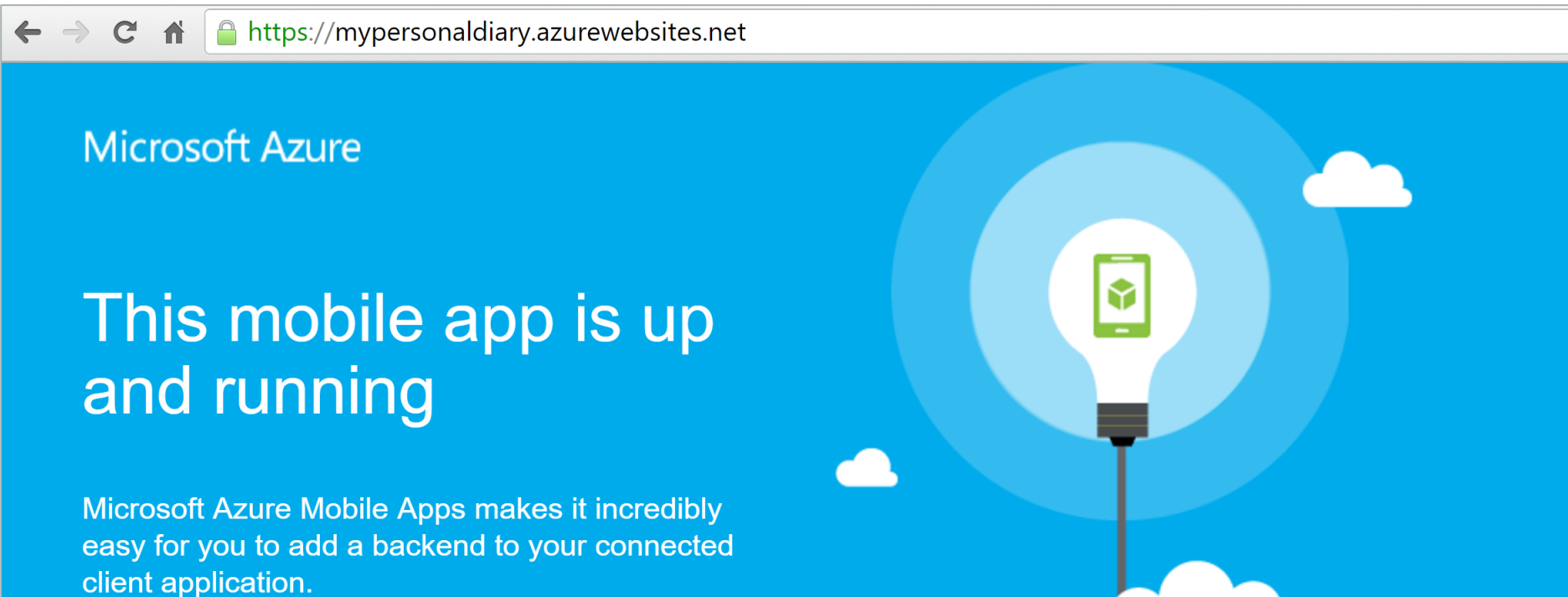
Visual Studio server project

- ❖ Template creates an ASP.NET starter app
- ❖ Includes two controllers – one for a database table and another for a basic web service
- ❖ Defines a Data Transfer Object (DTO) to hold a **TodoItem**



Check your service

❖ Once the service is started, it will respond to **GET** requests on the URL





Individual Exercise

Create a survey app service in Azure



Xamarin
University

Publishing to Azure

❖ Azure supports several publishing models to suite any project size



Manual push
from client



Manual push
from VS



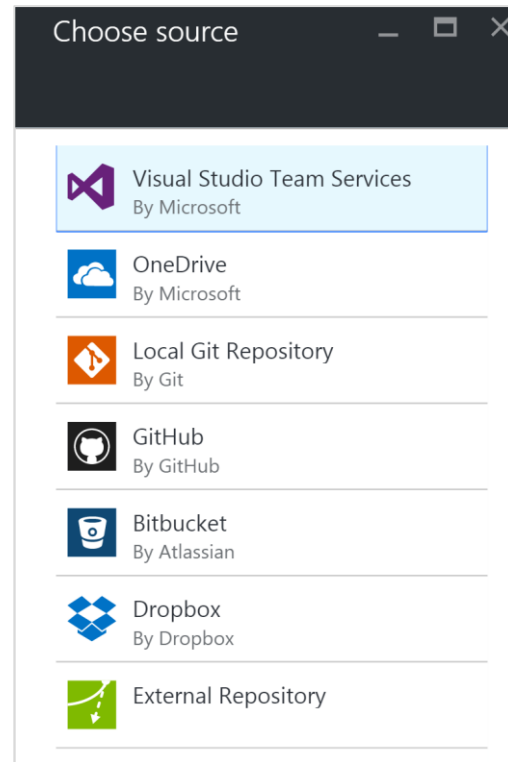
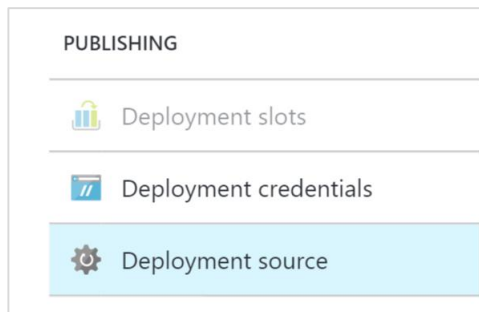
Manual push from cloud
or local Git
(OneDrive/Dropbox or Git/Mercurial)



Continuous Deployment
(TFS, Github or BitBucket)

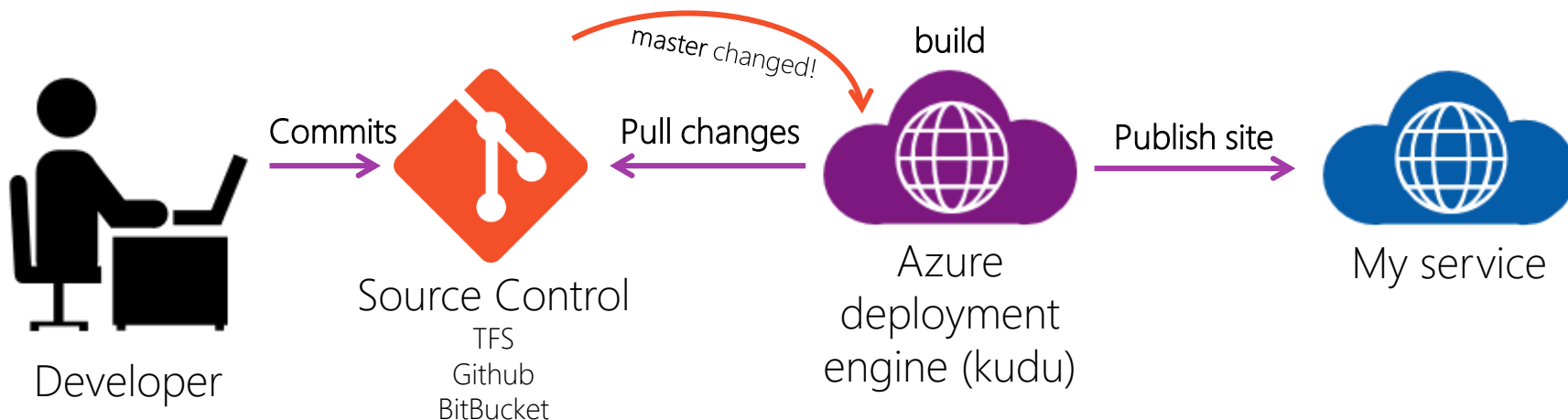
Setting up a deployment source

- ❖ Can setup a single publishing source through the **deployment source** option in your app publishing properties



Continuous development

- ❖ Can configure Azure size to **automatically pull changes** from TFS, Github or BitBucket when a new commit is detected



Configuring zero downtime

- ❖ Depending on your service plan, you can define *deployment slots* which let you create *copies* of your site on unique URLs and then swap them into production with zero down time

The screenshot shows the 'CastYourVote - Deployment slots' page in the Azure portal. The left sidebar contains a navigation menu with the following items: Backups, Custom domains and SSL, Deployment credentials, Deployment slots (highlighted), Deployment source, and Networking. The main content area features a table with the following columns: NAME, STATUS, and APP SERVICE PLAN. A single row is visible with the name 'castyourvote-beta', status 'Running', and app service plan 'ServicePlanf24a7e99-9587'. Above the table are buttons for '+ Add Slot' and 'Swap'. On the right, a 'Swap' panel is open, showing a 'Swap type' dropdown set to 'Swap', a 'Source' dropdown set to 'Beta', and a 'Destination' dropdown set to 'production'. Below these, it indicates 'Preview Changes' with 'No Warnings' and a lock icon.

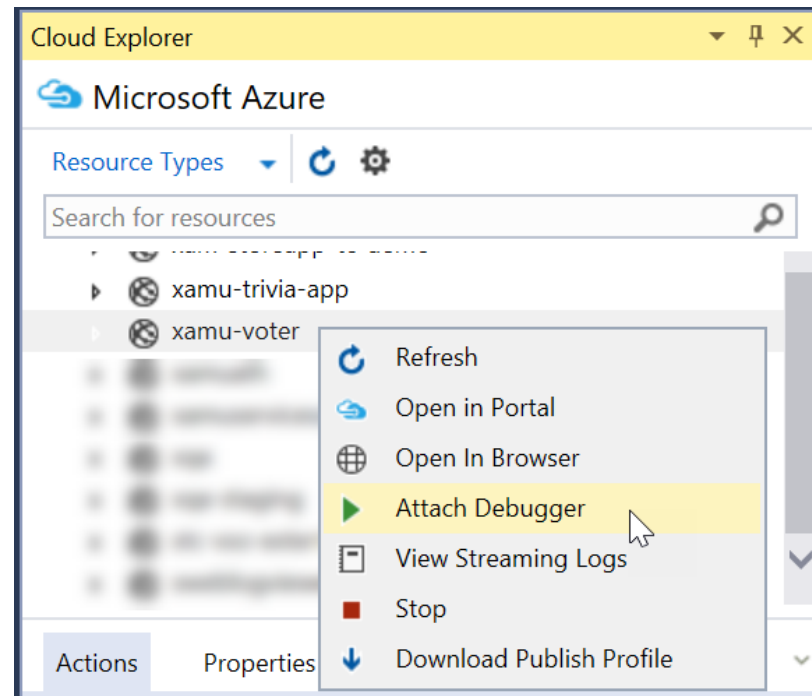
NAME	STATUS	APP SERVICE PLAN
castyourvote-beta	Running	ServicePlanf24a7e99-9587

Swap Panel:

- Swap type: Swap
- Source: Beta
- Destination: production
- Preview Changes: No Warnings

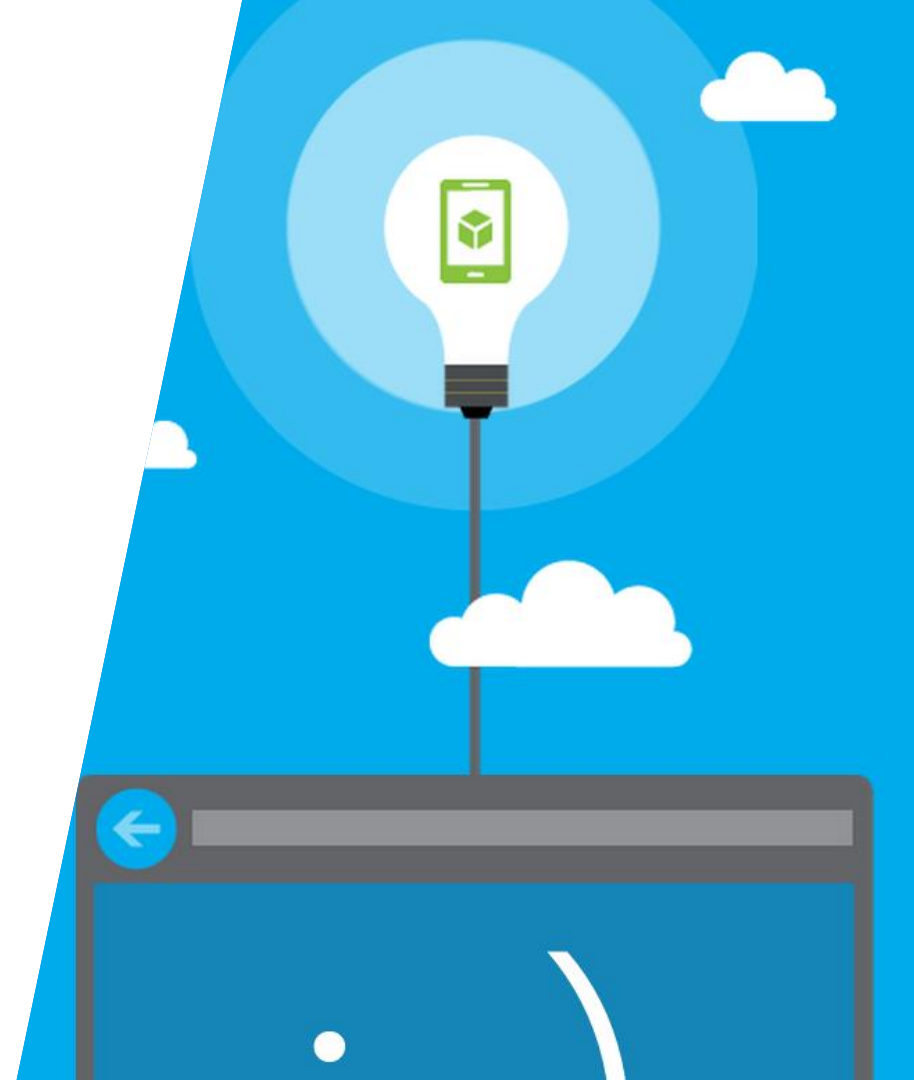
Debugging your app service

- ❖ When using the ASP.NET back end, you can debug your service code through the **Cloud Explorer** pane; right-click on the Web App and select **Attach Debugger**
- ❖ Must publish a **DEBUG** build first to get symbolic information – otherwise breakpoints won't resolve



Summary

1. Explore the mobile features provided by Azure App Services
2. Create a new Mobile app in the Azure Management portal
3. Create a new Mobile app in Visual Studio
4. Setup deployment publishing





Add a database to your back end

Tasks

1. Decide the proper type of database to add
2. Create the database + connection
3. Create one or more tables
4. Populate the database (optional)



Supplying data to your app

- ❖ Most applications will utilize some sort of server-side data - there are several questions to think about as you decide how to store the data

What type of data is it?
How is it queried?

How much data will you
be storing?

Is the data binary?

Azure data styles

- ❖ Azure provides several managed storage choices for apps



SQL Database
(relational)

Traditional SQL Server consisting of related tables with columns and rows; supports complex queries and everything SQL Server has to offer (e.g. transactions, indexes, constraints, stored procedures, etc.)

Azure data styles

- ❖ Azure provides several managed storage choices for apps



SQL Database
(relational)



Table Storage
(NoSQL key/value)

Fast, indexed table retrieval of structured NoSQL data; Table storage tends to cost less than SQL storage for similar volumes

Azure data styles

- ❖ Azure provides several managed storage choices for apps



SQL Database
(relational)



Large and unstructured
file storage; useful for
storing media assets and
other bits of opaque non-
textual data



Blob Storage
(unstructured files)

Azure data styles

- ❖ Azure provides several managed storage choices for apps



SQL Database
(relational)



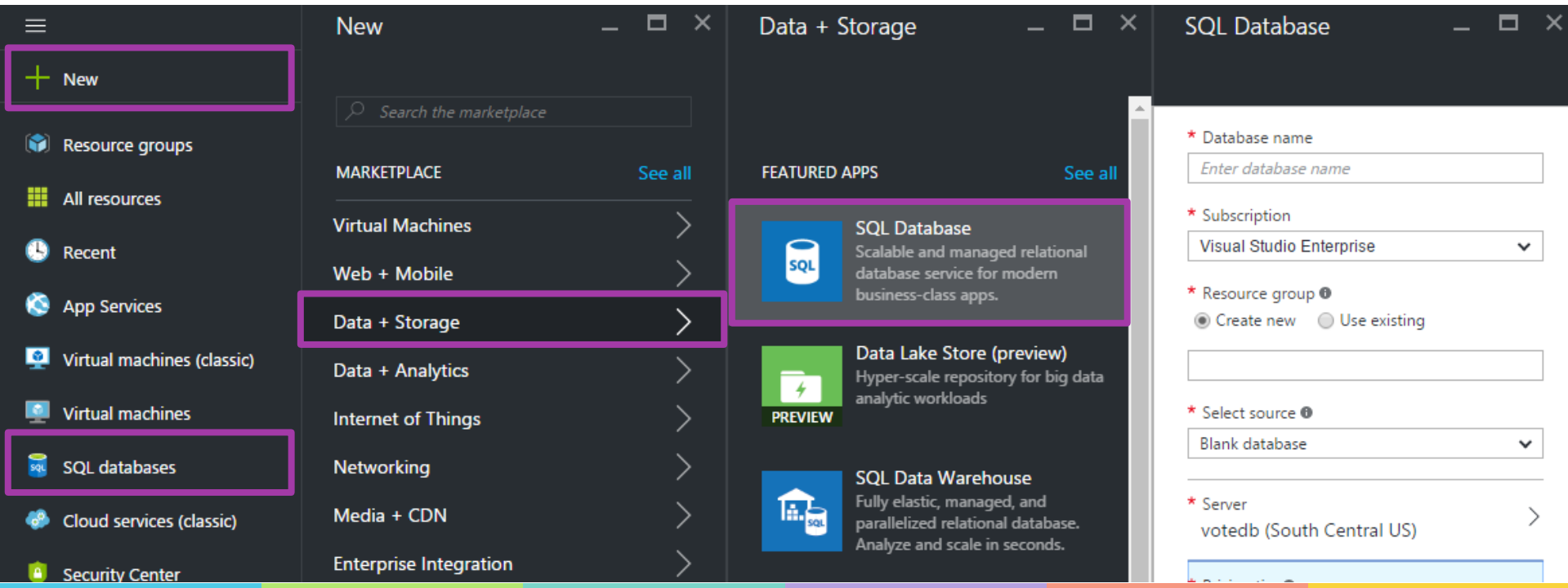
Table Storage
(NoSQL key/value)



Blob Storage
(unstructured files)

Creating a SQL database in Azure

- ❖ Must have a SQL Server database resource in your Azure portal



The screenshot displays the Azure portal interface with several key elements highlighted by purple boxes:

- Left Navigation Pane:**
 - The **+ New** button is highlighted at the top.
 - The **SQL databases** option is highlighted in the left-hand menu.
- Marketplace:**
 - The **Data + Storage** category is highlighted in the marketplace list.
- Featured Apps:**
 - The **SQL Database** app is highlighted, showing its description: "Scalable and managed relational database service for modern business-class apps."
- SQL Database Configuration Panel:**
 - The **Database name** field is highlighted with the placeholder text "Enter database name".
 - The **Subscription** dropdown is set to "Visual Studio Enterprise".
 - The **Resource group** section shows "Create new" selected.
 - The **Select source** dropdown is set to "Blank database".
 - The **Server** dropdown is set to "votedb (South Central US)".

Adding a SQL database to your app

- ❖ Must add a connection string to the app service; default expected name is `MS_TableConnectionString`

MOBILE



Easy tables



Easy APIs



Data connections



Push

Data Connections



NAME

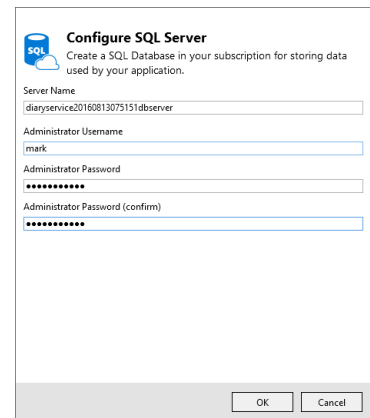
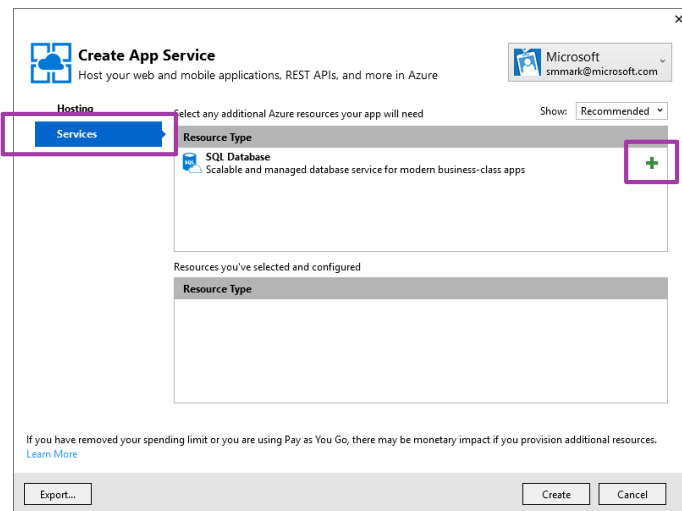
TYPE

MS_TableConnectionString

SQL Server

Adding a SQL database with VS

- ❖ Can also add a SQL database to your application when created through Visual Studio as part of the Azure setup; this must be done at app creation time using the **Services** tab on the **Create App Service** dialog





Individual Exercise

Add a database to your Survey service

Adding a table to your mobile service

- ❖ Depending on your back-end, the process for adding a new table will be different however the exposed endpoint will be the same



ASP.NET requires a controller be created to access the database and expose it over a RESTful endpoint; provides complete control over the endpoint and server-side logic applied



Node.js provides a no-code option which is configurable from the Azure management portal; includes some basic extension points for the table operations (read/insert/update/delete)

Adding a table to a .NET back end

- ❖ ASP.NET projects use a *controller* to expose a SQL server table as an OData web service endpoint; requires two things:

1

Data Transfer Object
(DTO)

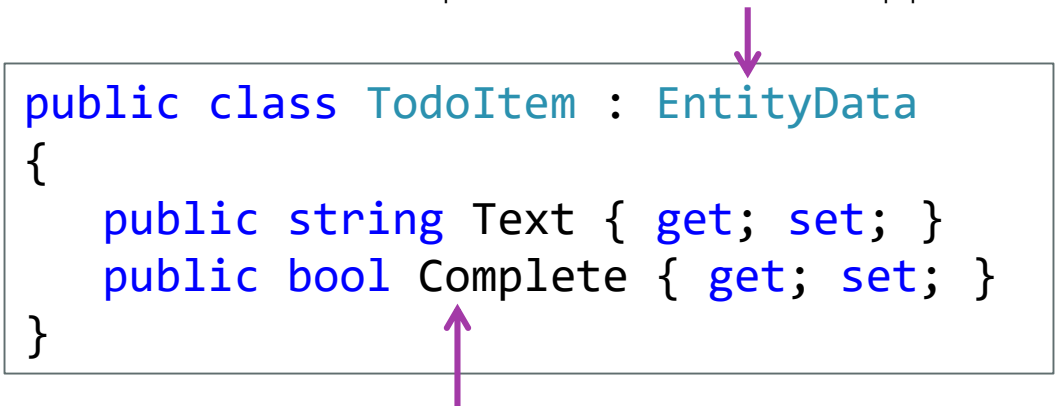
2

Table Controller
(`TableController<T>`)

Step 1: Define the DTO

- ❖ Data Transfer Objects (DTO) provide the *shape* of the data that will be passed to the client

Must derive from Azure SDK base class
which provides DB access support



A diagram illustrating the structure of the `TodoItem` class. A purple arrow points from the text 'Must derive from Azure SDK base class' to the `EntityData` base class in the code. Another purple arrow points from the text 'You add custom public properties' to the `Text` and `Complete` properties in the code.

```
public class TodoItem : EntityData
{
    public string Text { get; set; }
    public bool Complete { get; set; }
}
```

You add custom **public properties** to define your custom data to be stored in the database

What is EntityData?

- ❖ **EntityData** base class provides primary key and required synchronization data which is used/expected by the client/server communication
- ❖ Can add these columns to an existing DB, or let EF code-first create them which is the default behavior

```
public abstract class EntityData : ITableData
{
    [Key, TableColumn(TableColumnType.Id)]
    public string Id { get; set; }

    [DatabaseGenerated(DatabaseGeneratedOption.Identity)]
    [Index(IsClustered = true)]
    [TableColumn(TableColumnType.CreatedAt)]
    public DateTimeOffset? CreatedAt { get; set; }

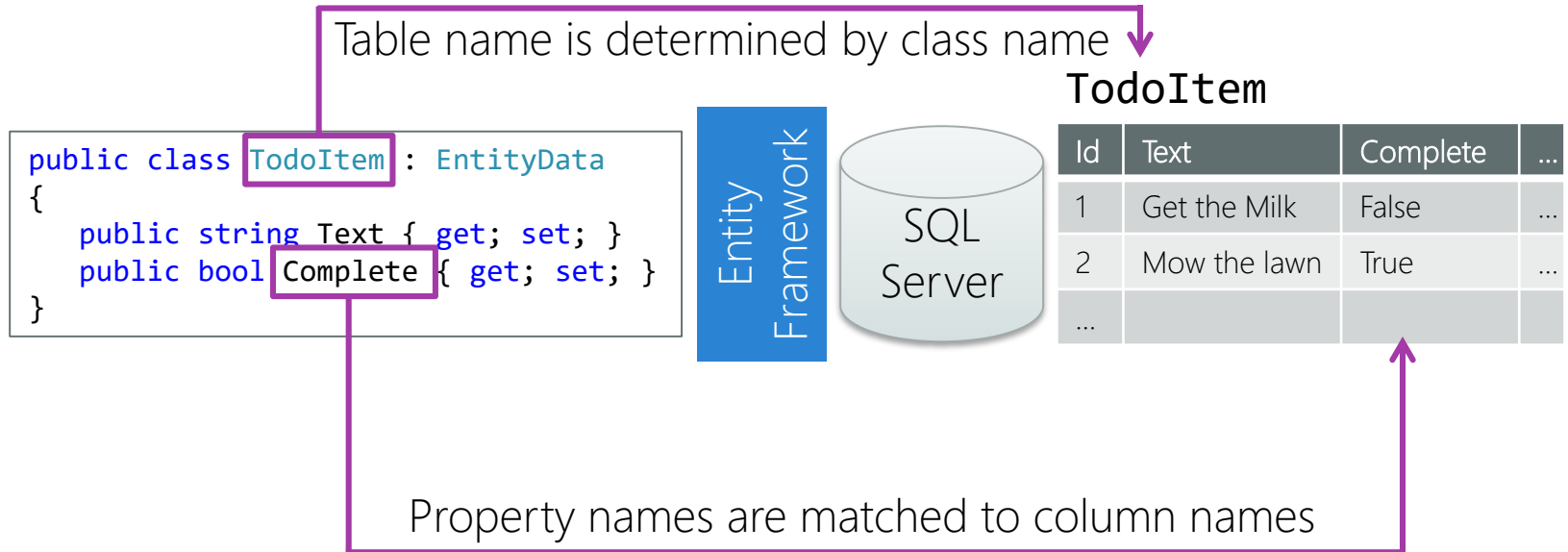
    [TableColumn(TableColumnType.Deleted)]
    public bool Deleted { get; set; }

    [DatabaseGenerated(DatabaseGeneratedOption.Computed)]
    [TableColumn(TableColumnType.UpdatedAt)]
    public DateTimeOffset? UpdatedAt { get; set; }

    [TableColumn(TableColumnType.Version), Timestamp]
    public byte[] Version { get; set; }
}
```

Mapping the DTO to a DB table

- ❖ DTO is mapped to a single database table using Entity Framework (EF); rows are exposed as instances of the DTO



Customizing the mapping

- ❖ Can apply **attributes** to customize how the DTO is mapped to the table

Use **tasks** table

→ `[Table("tasks")]`

Specify the table
column name

`public string Text { get; set; }`

→ `[Column("is_complete"), Index]`

← Add an index for
this column

Ignore property

`public bool Complete { get; set; }`

→ `[NotMapped]`

`public bool Tagged { get; set; }`

`}`

`public class TodoItem : EntityData`

`{`

JSON attributes

- ❖ Can change the shape of the object passed over the wire using standard JSON attributes; remember to coordinate with the client!

```
public class TodoItem : EntityData
{
    [JsonProperty(Name="todo")]
    public string Text { get; set; }
    public bool Complete { get; set; }
}
```



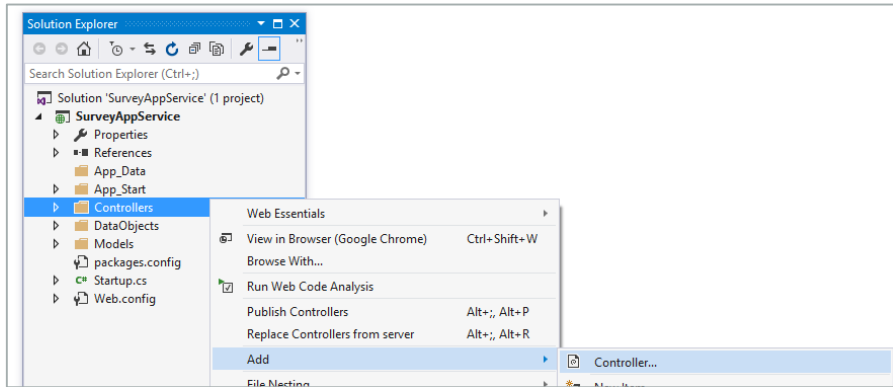
```
{
    "id": ...
    ...
    "complete": false,
    "todo": "My task"
},
```



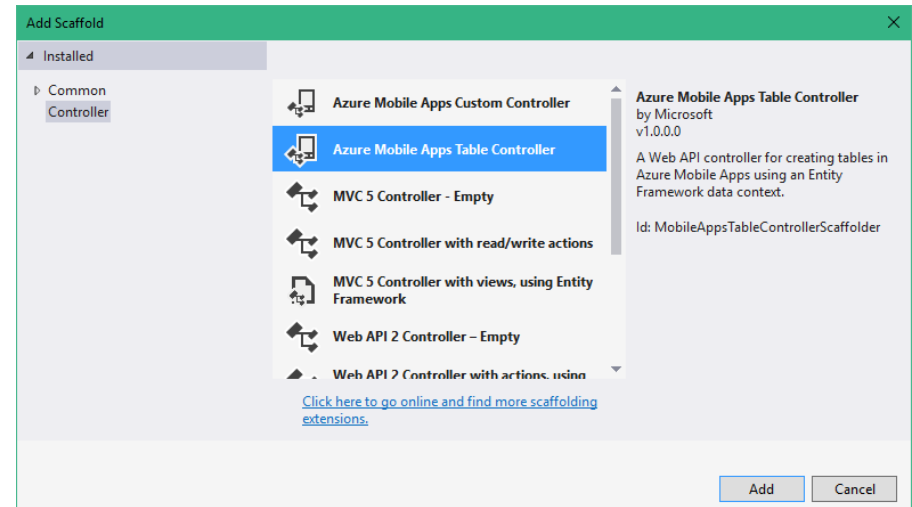
You can use either the JSON.net attribute (as shown here), or the data annotation (**DataMember**) attribute to change the names of the passed JSON fields

Step 2: define the Table Controller

- ❖ Must define a new controller to provide HTTP access to your table – easiest way to do this in VS is to use the **Add Scaffold** wizard



Select **Controller** from the **Add** menu and then select **Azure Mobile Apps Table Controller** from the dialog



What is a Table Controller?

- ❖ Table Controller provides the REST endpoint + EF database connection for a single DTO through a set of methods

```
public class TodoItemController : TableController<TodoItem>
{
    protected override void Initialize(HttpControllerContext context) {...}
    // GET tables/TodoItem
    public IQueryable<TodoItem> GetAllTodoItems() {...}
    // GET tables/TodoItem/{id}
    public SingleResult<TodoItem> GetTodoItem(string id) {...}
    // PATCH tables/TodoItem/{id}
    public Task<TodoItem> PatchTodoItem(string id, Delta<TodoItem> patch) {...}
    // POST tables/TodoItem
    public async Task<IHttpActionResult> PostTodoItem(TodoItem item) {...}
    // DELETE tables/TodoItem/{id}
    public Task DeleteTodoItem(string id) {...}
}
```

Table Controller: initialize

- ❖ Initialization method is responsible for creating the **domain manager** which maps and implements all the CRUD operations for the database and table used by the DTO

```
public class TodoItemController : TableController<TodoItem>
{
    protected override void Initialize(HttpControllerContext context)
    {
        base.Initialize(context);
        MobileServiceContext dbContext = new MobileServiceContext();
        DomainManager = new EntityDomainManager<TodoItem>(dbContext, Request);
    }
    ...
}
```

Table Controller: actions

- ❖ Table controller exposes an **async method** for each supported HTTP verb and (by default) delegates work to base class methods

```
public class TodoItemController : TableController<TodoItem>
{
    public IQueryable<TodoItem> GetAllTodoItems() { return base.Query(); }

    public async Task<IHttpActionResult> PostTodoItem(TodoItem item) {
        TodoItem current = await base.InsertAsync(item);
        return base.CreatedAtRoute("Tables", new { id = current.Id }, current);
    }

    public Task DeleteTodoItem(string id) {
        return base.DeleteAsync(id);
    }
}
```

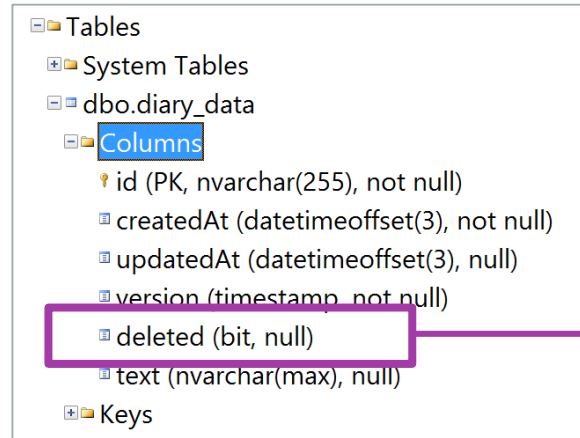
Customizing the method names

- ❖ Method name prefix (Get/Post/Patch/Delete) is required to infer proper HTTP action; can use WebApi attributes to customize action/name

```
public class TodoItemController : TableController<TodoItem>
{
    [HttpGet]
    public IQueryable<TodoItem> RetrieveAll() {...}
    [HttpGet]
    public SingleResult<TodoItem> RetrieveOne(string id) {...}
    [HttpPatch]
    public Task<TodoItem> Update(string id, Delta<TodoItem> patch) {...}
    [HttpPost]
    public async Task<IHttpActionResult> Add(TodoItem item) {...}
    [HttpDelete]
    public Task Remove(string id) {...}
}
```

Dealing with DELETE

- ❖ DELETE is a **destructive operation** which must be propagated to every client; tables can be configured to use a *soft delete* model where a **column in the database** is used to indicate that the record has been deleted



column is always present regardless of whether the server enables soft delete or not

Do I need soft delete?

- ❖ Soft delete means that records are **never deleted from the table**; this has benefits and drawbacks which you should weigh to decide whether you want this feature

Pros	Cons
Simplifies offline synchronization	Databases tend to require more space
Allows records to be "undeleted"	Id must be a string type and not reused
Useful for audit or requirements where records cannot be removed	Must write a server-side Azure Function or SQL trigger to periodically purge records

ASP.NET: turning on soft delete

- ❖ Must enable soft delete for each table through the **EntityDomainManager** constructor in your table controller initialization

```
public class TodoItemController : TableController<TodoItem>
{
    protected override void Initialize(HttpControllerContext controllerContext)
    {
        base.Initialize(controllerContext);
        MobileServiceContext context = new MobileServiceContext();
        DomainManager = new EntityDomainManager<TodoItem>(
            context, Request, enableSoftDelete: true);
    }
    ...
}
```

Defining a custom API controller

- ❖ Can expose traditional REST endpoints with ASP.NET Web API by deriving from the **ApiController** base class

```
[MobileApiController]
public class HelloController : ApiController
{
    [HttpGet]
    public string SayHello() {
        return "Hello, Azure!";
    }
    ...
}
```

Should decorate with
[MobileApiController]
attribute to integrate with Azure
service platform

Flash Quiz

Flash Quiz

- ① SQL tables can be exposed from either **node.js** or **ASP.NET** back ends
- a) True
 - b) False

Flash Quiz

- ① SQL tables can be exposed from either **node.js** or **ASP.NET** back ends
- a) True
 - b) False

Flash Quiz

- ② You can define the schema for exposed tables through the Azure portal when using an ASP.NET back end
- a) True
 - b) False

Flash Quiz

- ② You can define the schema for exposed tables through the Azure portal when using an ASP.NET back end
- a) True
 - b) False

Adding a table to a node.js back end

- ❖ **Node.js** back end provides "no-code" web access to SQL data through the **easy tables** API which has several key benefits



Uses SQL Azure as the database storage



Exposes OData endpoint with no additional code required



Can define and change DB schema in Azure portal



Supports server-side logic for database operations

How to configure Easy tables API

- ❖ Easy tables must be configured for your mobile app in the Azure portal to expose the endpoint the app will use to communicate with the database

mypersonaldiary - Easy Tables
MOBILE APP

+ Add ↗ Add from CSV

API

- API definition
- CORS

MOBILE

- Easy tables**

Need to configure Easy Tables/Easy APIs - Click here to continue →

NAME
No results.

Portal will do all the hard work for you – just click on the header to get the list of steps required

Setting up Easy table support

- ❖ Two required steps to turn on the easy tables support in your app service, portal will walk you through both as part of the setup

1

Create or select the SQL database and the connection string

2

App service must be configured to use easy tables – this is a one-time operation that configures the web server

Creating Easy tables

- ❖ Once a SQL database connection is setup, you can add one or more Easy table definitions to the database using two approaches



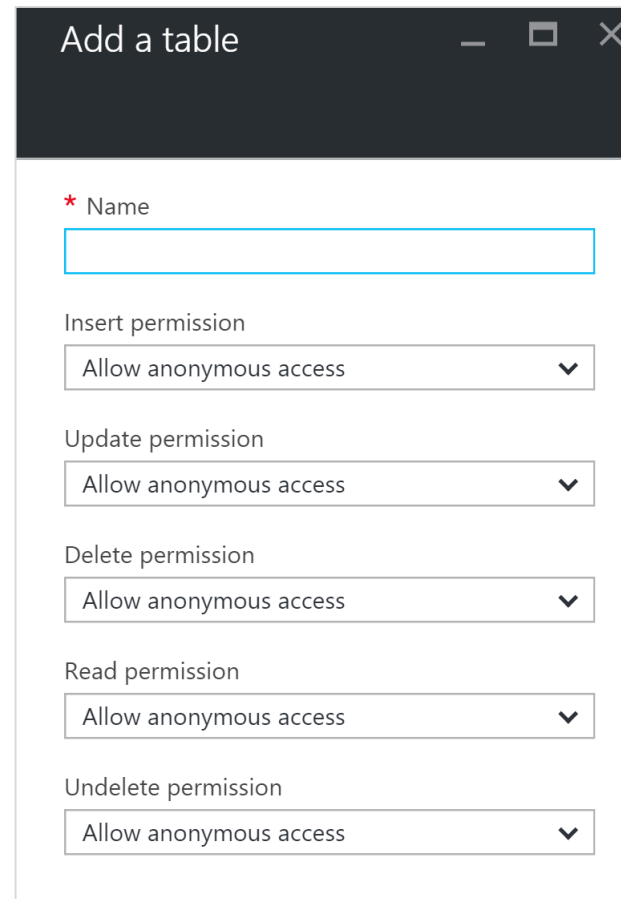
Azure Portal



Web server configuration

Using the Azure portal

- ❖ Can use the Azure portal to add new tables to your associated SQL database – this is the easiest option since it's GUI driven
- ❖ Must provide a locally-unique table name and define the permissions for CRUD operations (defaults to anonymous)

A screenshot of the 'Add a table' dialog box in the Azure portal. The dialog has a dark header bar with the title 'Add a table' and standard window controls (minimize, maximize, close). The main content area is white and contains a form with the following fields: a required text input for 'Name' (indicated by a red asterisk), and five dropdown menus for permissions: 'Insert permission', 'Update permission', 'Delete permission', 'Read permission', and 'Undelete permission'. Each dropdown menu currently shows 'Allow anonymous access' and a downward arrow.

Schema for an Easy table

- ❖ Just like ASP.NET, each table has 5 required columns to identify each row and support offline synchronization

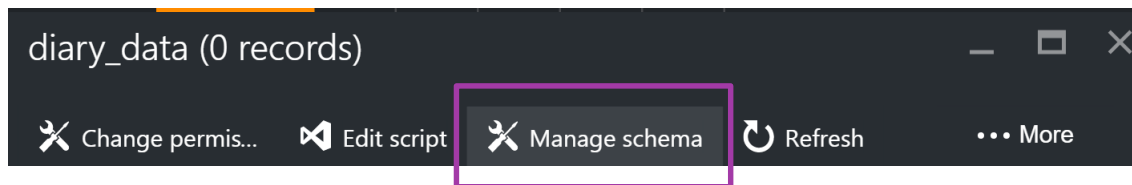
Column	SQL Type	Description
id	NVARCHAR(255)	Unique identifier for this record (typically GUID)
createdAt	DATETIMEOFFSET	Date/time that this record was initially added
updatedAt	DATETIMEOFFSET	Last date/time that this record was changed
version	TIMESTAMP	Version of this record, used for synchronization
deleted	BIT	Set if this record has been deleted, used for sync.



You can add these columns to an existing SQL table to allow it to be used with the API – see <http://bit.ly/2aANOTz> for more information on the necessary steps

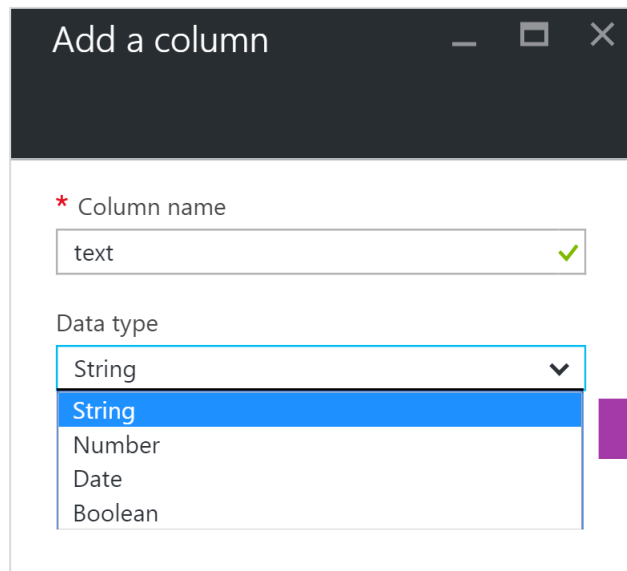
Creating unique data columns

- ❖ You must define additional columns using the Easy Tables blade to store your app-specific data, use the **Manage schema** option in the toolbar to open the schema editor



Adding a new column

- ❖ Each column has a unique column name (traditional naming rules apply) and a column type which is translated to a SQL data type



Add a column

* Column name

text ✓

Data type

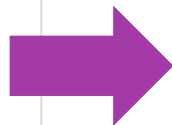
String ▼

String


Number

Date

Boolean



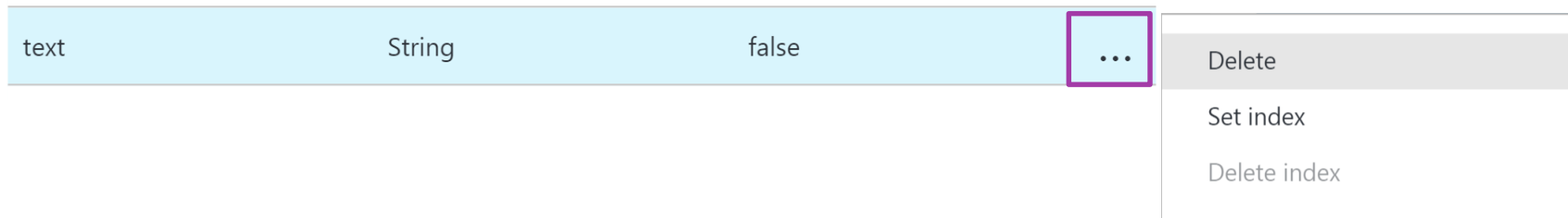
String	nvarchar(max)
Number	float(53)
Date	datetimeoffset(7)
Boolean	bit



Columns cannot be altered once you have created them so choose carefully!

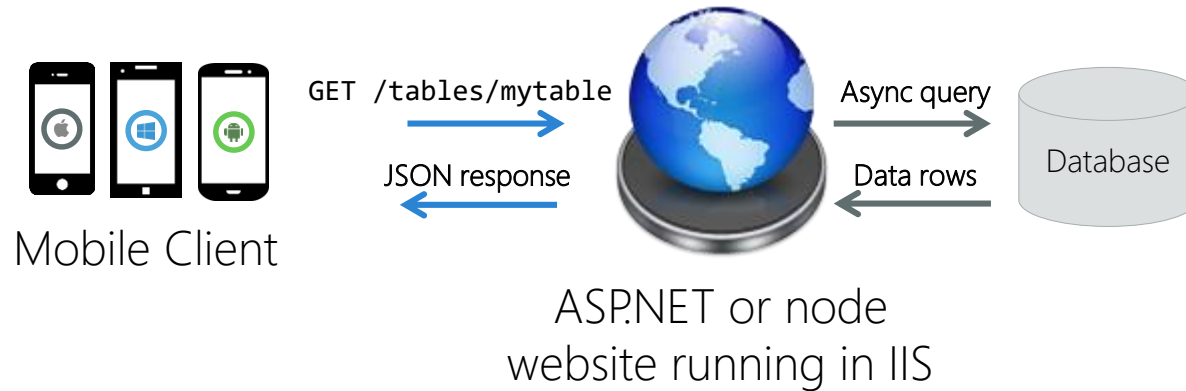
Deleting columns

- ❖ Can delete a column or create a DB index on it through the row context menu; deleting and re-creating a column is your portal workaround to changing the column definition



Accessing tables from a client

- ❖ App service exposes a hard-coded endpoint (`/tables/<tablename>`) to allow applications to perform DB queries and operations using HTTP



Testing the service endpoint

- ❖ Can use a REST client to interact and test the endpoint; mandatory HTTP header **ZUMO-API-VERSION: 2.0.0** must be included



Postman
(free Chrome plugin)



Paw
(macOS app)



REST client
(Firefox plugin)



Fiddler
(Windows network analyzer)

```
curl -g -H ZUMO-API-VERSION:2.0.0 <site>/tables/{tablename}
```


Inserting, Updating and Deleting

- ❖ **POST** (insert), **PATCH** (update) and **DELETE** require an HTTP body encoded in JSON with a Content-Type set to **application/json**

```
POST /tables/{tablename} HTTP/1.1
Host: <site>
ZUMO-API-VERSION: 2.0.0
Content-Type: application/json

<JSON data goes here>
```

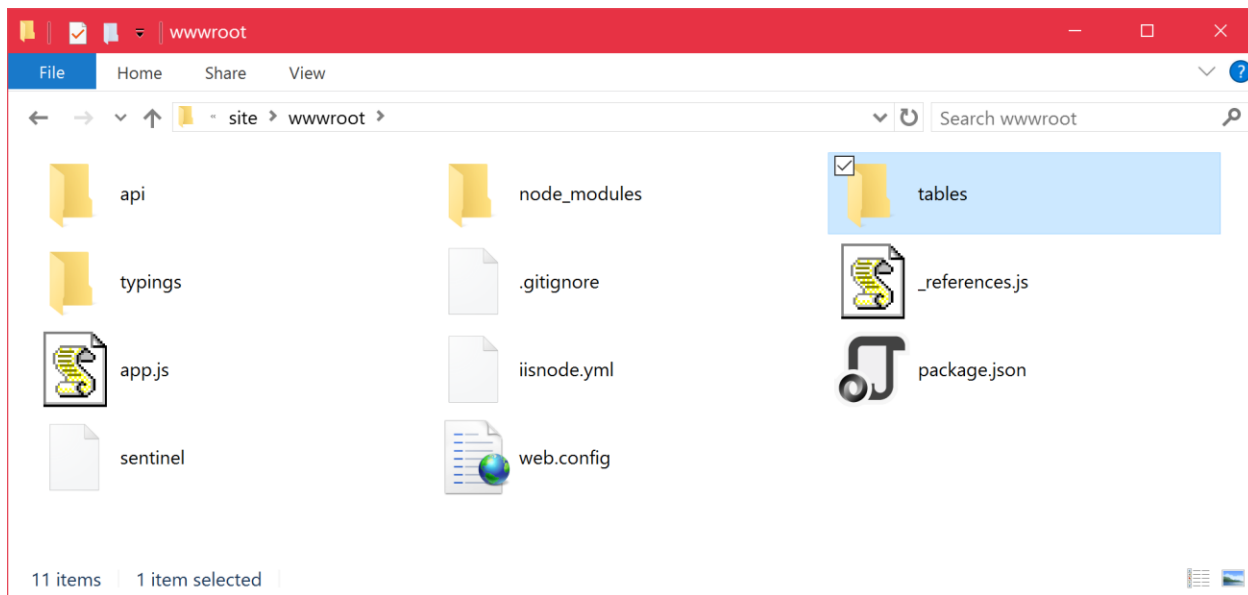


Individual Exercise

Add a new table into the Survey service

Easy Table web structure

- ❖ Node.js looks in hardcoded **tables** folder for Easy Table definitions



Adding new Easy tables to the server

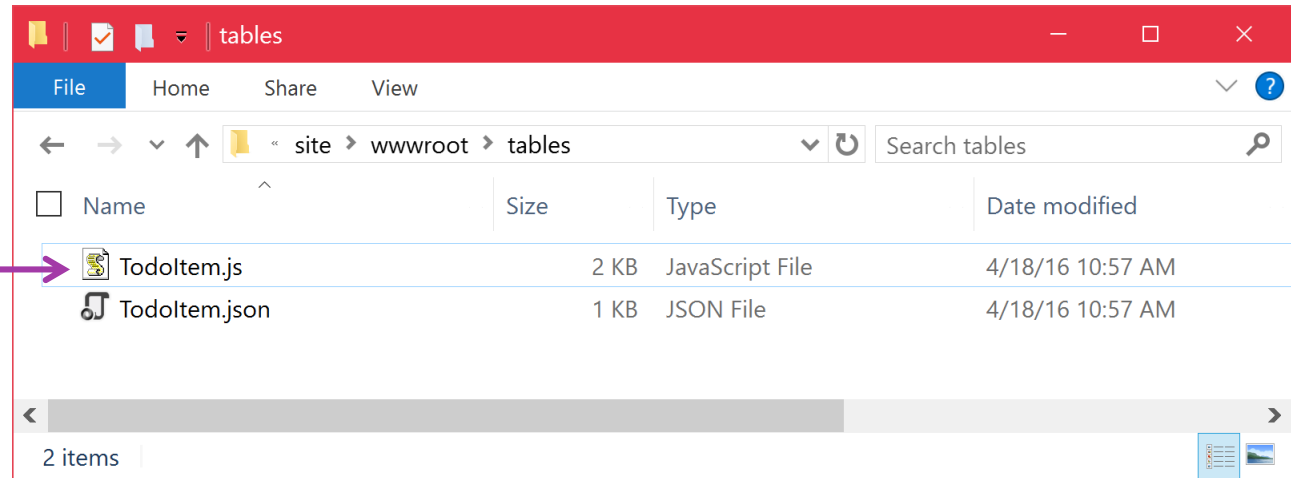
- ❖ Can add or edit tables to Easy Table configuration by manipulating the files in the **tables** folder
- ❖ Server will create/edit your tables the next time an HTTP request is processed



Easy table definition

- ❖ Easy table is defined by **two files**; the filename is used to locate the proper SQL table and determine the final URL endpoint

Here we are defining the **todoitem** table & **/tables/todoitem** endpoint



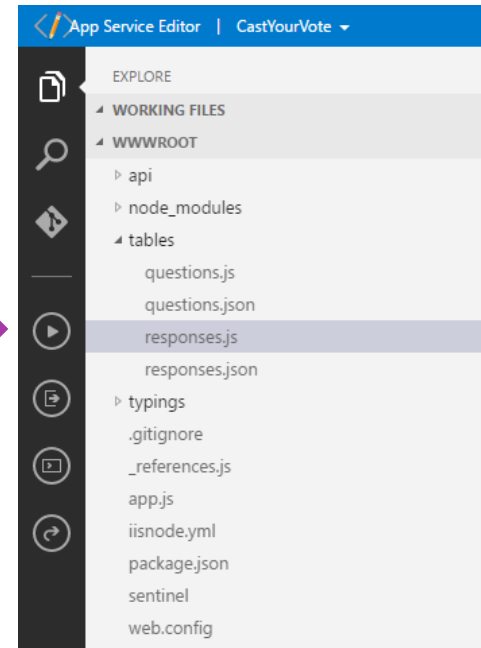
Editing existing Easy Tables

- ❖ Can also edit the scripts backing an Easy Table through the Azure portal



Can edit the already-created JSON files directly from the portal through the **Edit Script** toolbar button in each defined Easy Table blade

Opens site in VS
online editor



Creating a new table in JSON

```
{
  "softDelete": true,
  "autoIncrement": false,
  "insert": {
    "access": "anonymous"
  },
  "update": {
    "access": "anonymous"
  },
  "delete": {
    "access": "anonymous"
  },
  "read": {
    "access": "anonymous"
  },
  "undelete": {
    "access": "anonymous"
  }
}
```

{table}.json

JSON **description file** provides default property values for table settings

Creating a new table in JSON

```
{
  "softDelete": true,
  "autoIncrement": false,
  "insert": {
    "access": "anonymous"
  },
  "update": {
    "access": "anonymous"
  },
  "delete": {
    "access": "anonymous"
  },
  "read": {
    "access": "anonymous"
  },
  "undelete": {
    "access": "anonymous"
  }
}
```

{table}.json

JS **table script** adds the table endpoint and provides a customization point for table operations

```
var app = require('azure-mobile-apps');
// Create a new easy table definition
var table = app.table();
// Never allow updates to records
table.update.access = 'disabled';

module.exports = table;
```

{table}.js

Defining custom columns

- ❖ Can define column structure as part of the table controller (.js) file

```
var app = require('azure-mobile-apps');
var table = app.table();

// Define our columns for the DB table (defined as JSON)
table.columns = {
  "text": "string",
  "isPrivate": "boolean"
};
// Turn off dynamic schema
table.dynamicSchema = false;

module.exports = table;
```

Turning off soft delete

- ❖ Node.js back end enables soft delete by default – can turn it off by changing the **softDelete** flag on the specific table

```
{  
  "softDelete": false,  
  "autoIncrement": false,  
  ...  
}
```

or

```
var table = module.exports =  
  require('azure-mobile-apps')  
    .table();  
table.softDelete = false;  
...
```

Can change the **softDelete** flag in the configuration or table controller source

Populating the DB with data

- ❖ Tables are created empty by default – there are several ways to pre-populate the SQL data; either as part of creation, or post-creation



Define schema and insert data from a **comma-separated-value** file



Code-first seed method



SQL Management Studio

Populating Easy Tables

- ❖ **Add From CSV** option allows you to define the table structure *and* import records into the database with Easy Tables

person.csv


Name,Email,Phone
Mark Smith,mark@julmar.com,9025551212
John Doe,jodo@anonymous.com,2145551212
Jane Austin,jane@greengables.com,9725551212


⬆ Add from CSV ➡





File *must* have a terminating CR/LF on the final line or that line will not be imported


Add from CSV (preview)

person.csv 

* Name
person 

Name
String 

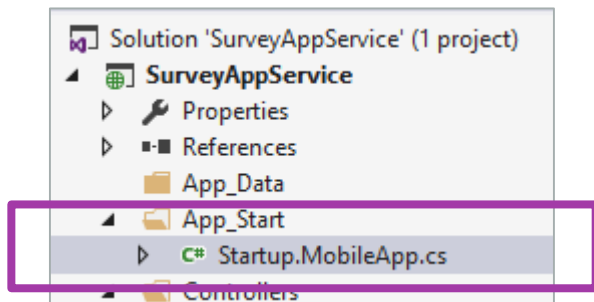
Email
String 

Phone
Number 

Start Upload

Populating Entity Framework

- ❖ ASP.NET and EF use an *initializer* method to create and seed a table when it does not exist in the target database



```
public class MobileServiceInitializer
    : CreateDatabaseIfNotExists<MobileServiceContext>
{
    protected override void Seed(MobileServiceContext context)
    {
        ... // TODO: add items to DB context here
    }
}
```

Add code to populate data using passed **DbContext** to the existing **MobileServiceInitializer** class

Populating the table with data

- ❖ Can add data directly into the underlying SQL database by accessing it through SQL Server credentials available from **SQL database blade**

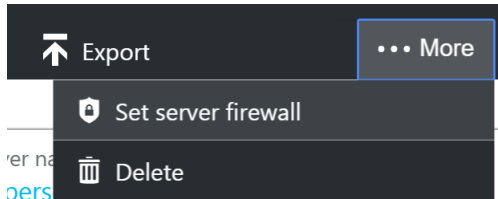
The screenshot shows the Azure portal interface for an SQL database named 'diary'. The left sidebar contains navigation options: Overview (selected), QUICK ACCESS, Activity logs, and Tags. The main content area displays the 'Essentials' section with the following details:

Resource group	DiaryApp	Server name	mypersonaldiary.database.windows.net
Status	Online	Server version	V12
Location	South Central US	Connection strings	Show database connection strings
Subscription name	Visual Studio Enterprise	Pricing tier	Basic (5 DTUs)
Subscription ID	[REDACTED]	Geo-Replication role	Not configured




The 'Show database connection strings' link is highlighted with a purple rectangular box.


Changing the firewall rules

- ❖ By default, direct SQL access is limited to Azure, but you can change the firewall rules to allow external access



Firewall settings
mypersonaldiary (SQL server)

 Save  Discard  Add client IP

 Connections from the IPs specified below provides access to all the databases in mypersonaldiary.

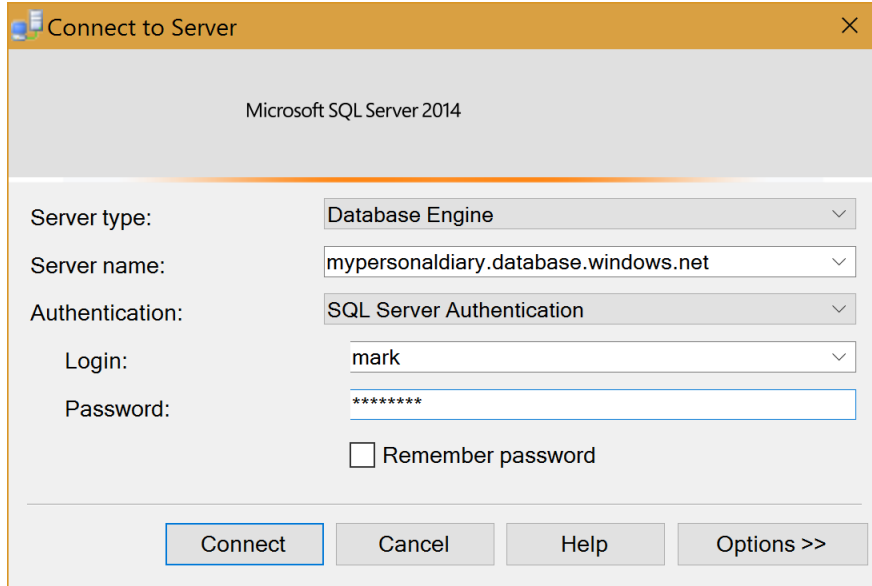
Allow access to Azure services ☒ ON ☐ OFF

Client IP address 68.191.180.62

RULE NAME	START IP	END IP	
			...
Mark-Office	104.106.4.160	104.106.4.160	...

SQL Management Studio

- ❖ Azure sets up SQL Server authentication – just need server URL and user/password you setup the database with



Connect to Server

Microsoft SQL Server 2014

Server type: Database Engine

Server name: mypersonaldiary.database.windows.net

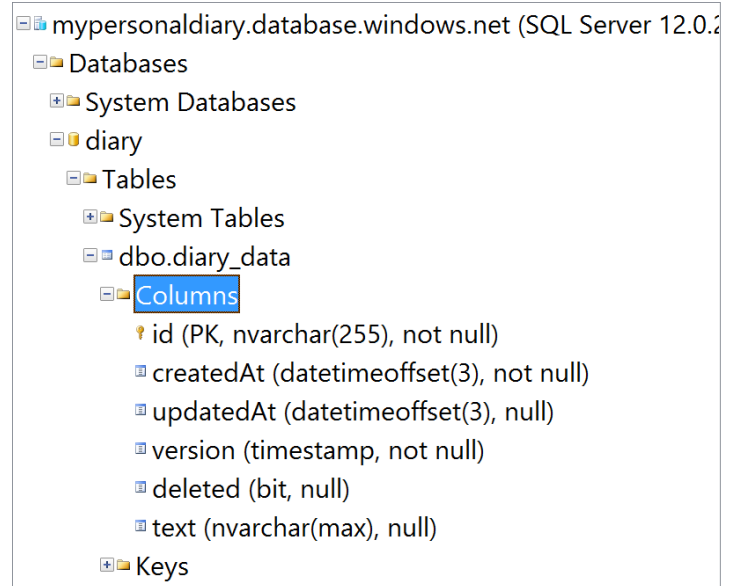
Authentication: SQL Server Authentication

Login: mark

Password: *****

☐ Remember password

Connect Cancel Help Options >>



mypersonaldiary.database.windows.net (SQL Server 12.0.2)

- Databases
 - System Databases
 - diary
 - Tables
 - System Tables
 - dbo.diary_data
 - Columns
 - id (PK, nvarchar(255), not null)
 - createdAt (datetimeoffset(3), not null)
 - updatedAt (datetimeoffset(3), null)
 - version (timestamp, not null)
 - deleted (bit, null)
 - text (nvarchar(max), null)
 - Keys

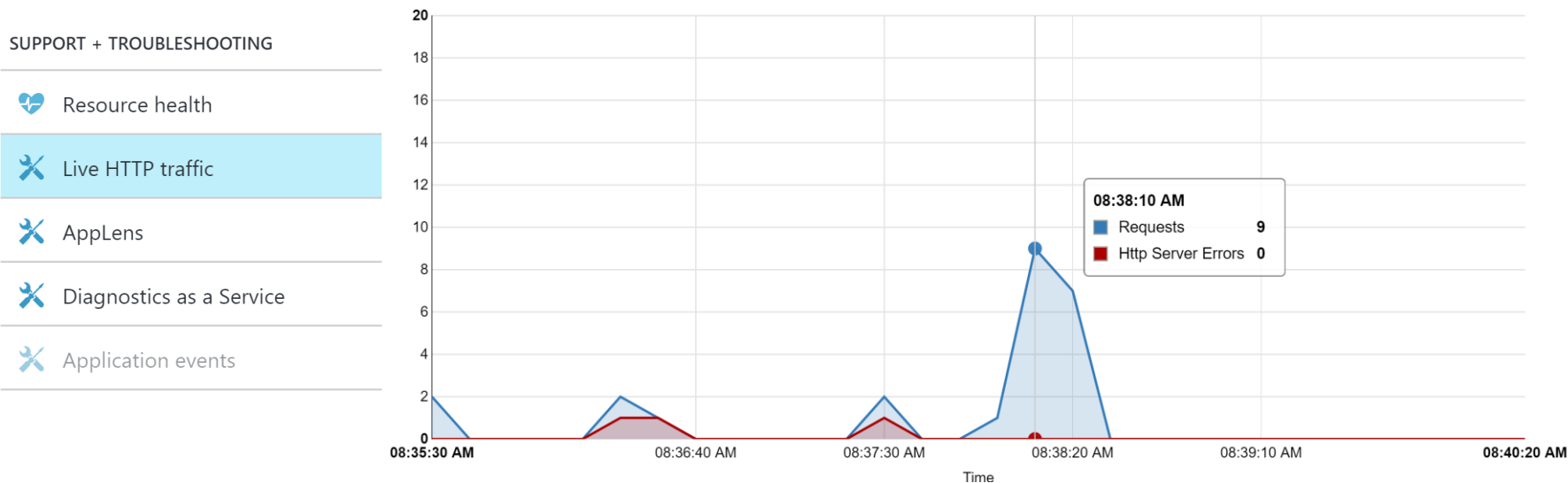


Individual Exercise

Create and populate our survey questions in the Azure portal

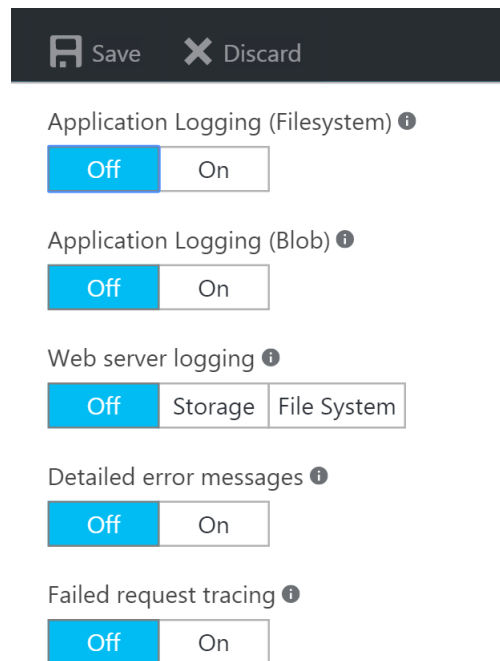
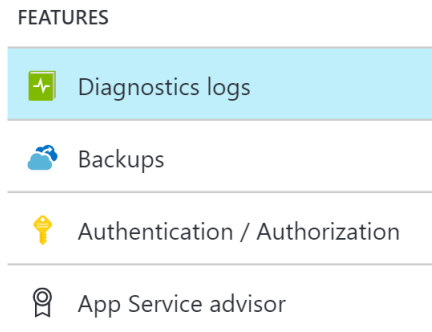
Monitoring the server side traffic

❖ Can monitor the server-side requests through the app portal blade



Get diagnostic details








- ❖ Can enable IIS diagnostic logging in the app to get fine-grained details



Watching the (almost) live stream

- ❖ Use the **Log Stream** feature to watch the app + IIS logs on the portal

OBSERVE

-  Log stream
-  Process explorer
-  Resource explorer
-  Alerts
-  Performance monitoring
-  Tinfoil Security
-  Zend Z-Ray

Application logs Web server logs Pause Start Clear

```
2016-08-04 13:50:55 GET /tables/diary_entry - 80 -  
xx.xx.xx.xx mydiary.azurewebsites.net 200 0 0 378  
285 94  
2016-08-04 13:52:49 POST /tables/diary_entry - 80 -  
xx.xx.xx.xx mydiary.azurewebsites.net 201 0 0 766  
1121 31  
2016-08-04 13:53:15 DELETE /tables/diary_entry - 80  
- xx.xx.xx.xx mydiary.azurewebsites.net 200 0 0 570  
1313 142
```

Collecting other details

- ❖ Several other tools available in the portal to collect a variety of performance, runtime and historical data about your app
- ❖ App can also be configured to collect data from Application Insights and New Relic



Summary

1. Decide the proper type of database to add
2. Create the database + connection
3. Create one or more tables
4. Populate the database (optional)



Next Steps

- ❖ We've covered the basics of building an Azure App mobile service using either node or ASP.NET
- ❖ The next set of classes will focus on the client side and how to consume the service from a Xamarin application

What's
NEXT

The word 'NEXT' is rendered in a large, bold, dark blue sans-serif font. A thick purple arrow starts at the top of the 'N', goes up and to the right, then turns down and to the right, ending at the top of the 'T'. The word 'What's' is written in a blue, italicized sans-serif font above the 'N'.

Thank You!

Please complete the class survey in your profile:
university.xamarin.com/profile

