

2017.03.02



# Microsoft Azure

## Cloud Computing and Hosting

Hans-Petter Halvorsen



The Cloud



# Cloud Hosting and Services

Hans-Petter Halvorsen, M.Sc.

# Cloud Computing and Hosting Providers



They rent Cloud based services like Virtual Machines (Computers with OS running in the Cloud), Web Server, Database Systems to Customers based on Monthly Fees



# Deployment

Deployment of Databases, Web Sites, Web Apps, Web Services, etc.

Hans-Petter Halvorsen, M.Sc.

# What is Deployment?

Software deployment is all of the activities that make a software system available for use.

Examples:

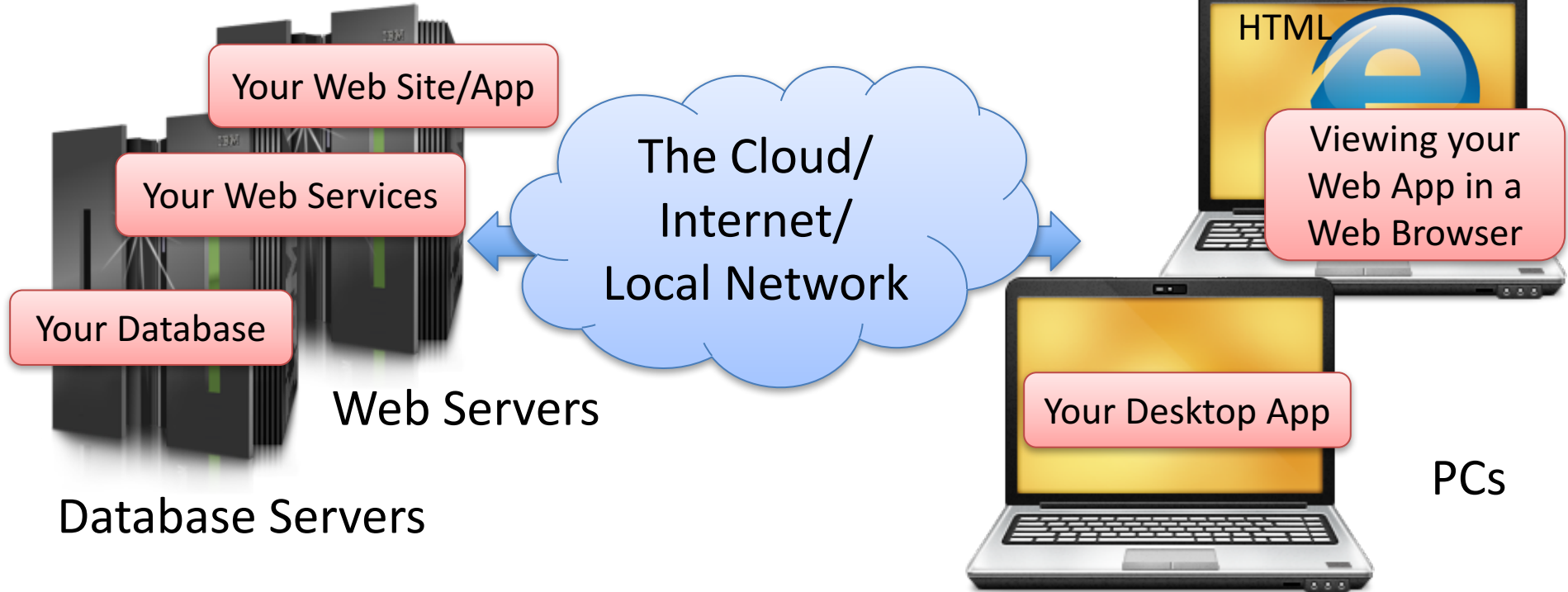
- Get the software out to the customers
- Creating Installation Packages
- Documentation
  - Installation Guide, etc.
- Installation
- etc.

Deployment strategies may vary depending of what kind of software we create, etc. (e.g. Desktop App vs. Web Site)

# Deployment

## Server-side Software

## Client-side Software



# Deployment of different types of Apps

 **ORACLE**  
 **Microsoft SQL Server**  **MySQL**  
Databases Web Servers



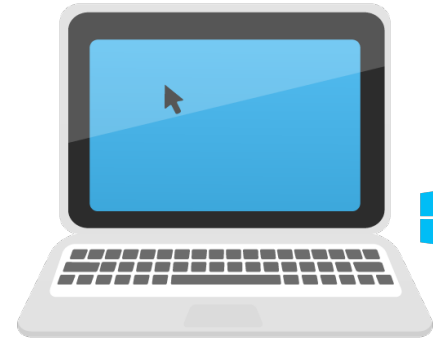
Services and Applications

Cloud Services



Web Apps

Mobile Apps



Desktop Apps

# Deployment on different Platforms



**Developer:** Need to create .Exe files and Installation/Setup packages and distribute these to the End-users.  
**End-user:** Installation is not always easy, especially for non-experience users.

**Developer:** Need to Deploy to App Stores.  
**End-user:** Easy to install from an App store. Updates can be installed automatically.

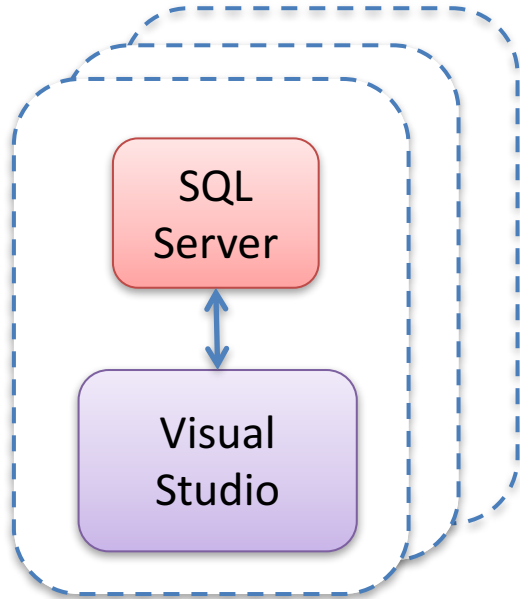
**Developer:** Need to Deploy to Web Servers.  
**End-user:** Don't need to install anything, available from a Web Browser. Latest version always available without any installation.





# Developer Environment vs. Production Environment

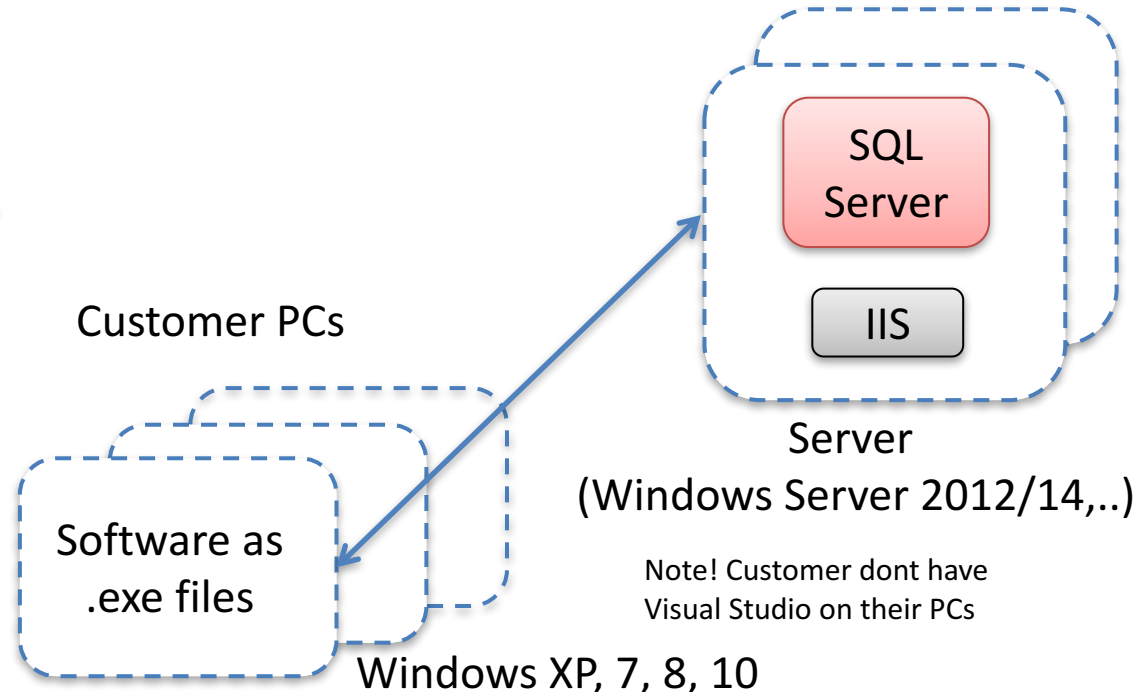
## Developer PC



Windows 8, 10

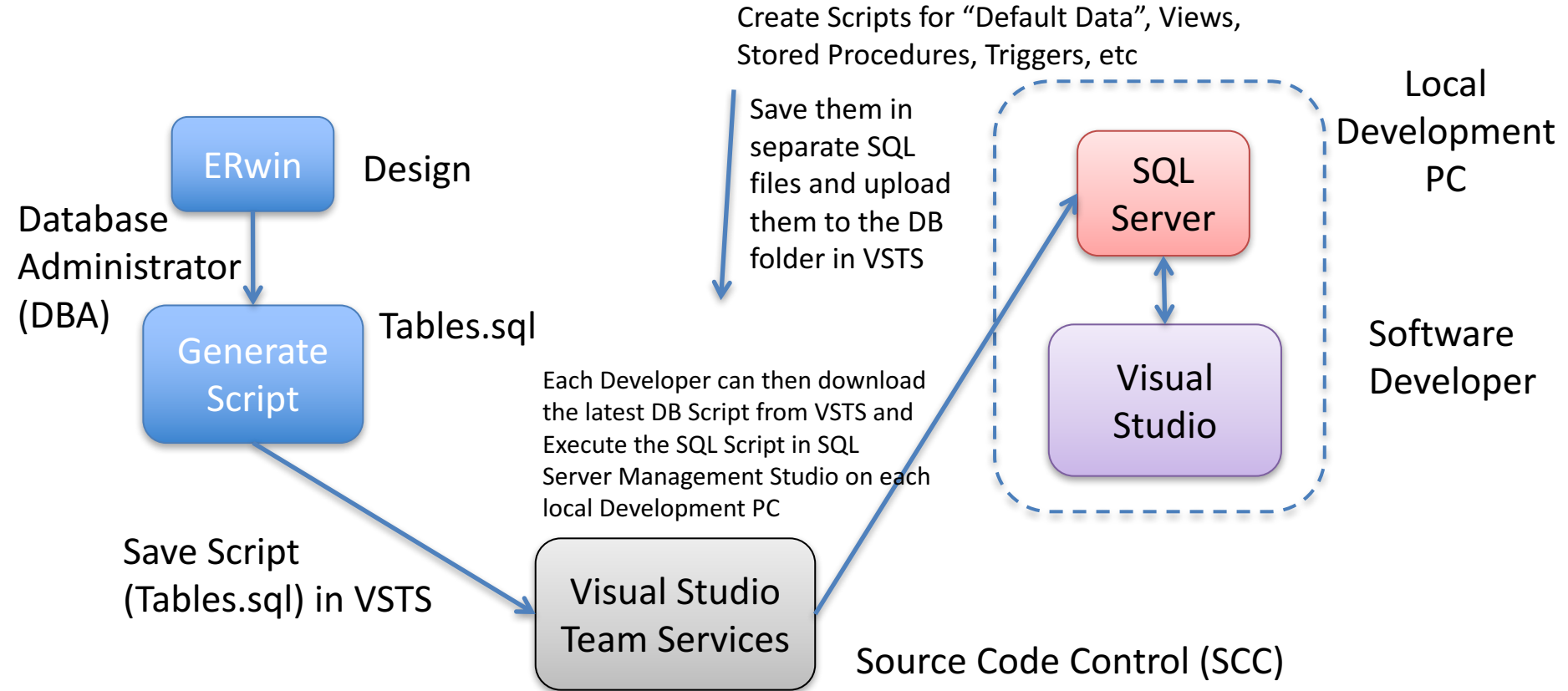


## Customer (Production) Environment



Note! Customer dont have Visual Studio on their PCs

# Create Database SQL Scripts



The DBA is in charge of maintaining the DB Script that can be used on the Developer PCs and later deployed in the Customer Environment



# Web Deployment

Deployment of Web Sites, Web Apps, Web Services, etc.

Hans-Petter Halvorsen, M.Sc.

# Web Deployment

Servers



Web Servers

Database Servers

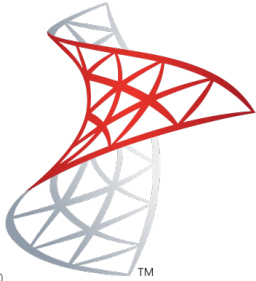
The Cloud/  
Internet/  
Local Network

Clients



PCs with Web Browsers

# Database Platforms



Microsoft®  
SQL Server®

ORACLE®



MySQL®



mongoDB



MariaDB

# Web Server Platforms

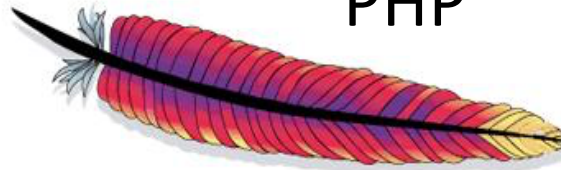


(pronounced "engine x")  
- Has become very popular lately

Cross-platform: UNIX, Linux, OS X, Windows, ...

The term web server can refer to either the hardware (the computer) or the software (the computer application) that helps to deliver web content that can be accessed through the Internet.

The most common use of web servers is to host websites, but there are other uses such as gaming, data storage or running enterprise applications.



PHP

# Apache



# Microsoft IIS

Internet Information Services

ASP.NET



# Microsoft Azure

Hans-Petter Halvorsen, M.Sc.

# Microsoft Azure

“Windows running in the Cloud”

SQL  
Databases

Virtual  
Machines

Storage

Cloud  
Services


App  
Services


Microsoft Azure





+ New


 Resource groups


 All resources


 Recent


 App Services


 Virtual machines (classic)

 Virtual machines

 SQL databases

 Cloud services (classic)

 Security Center

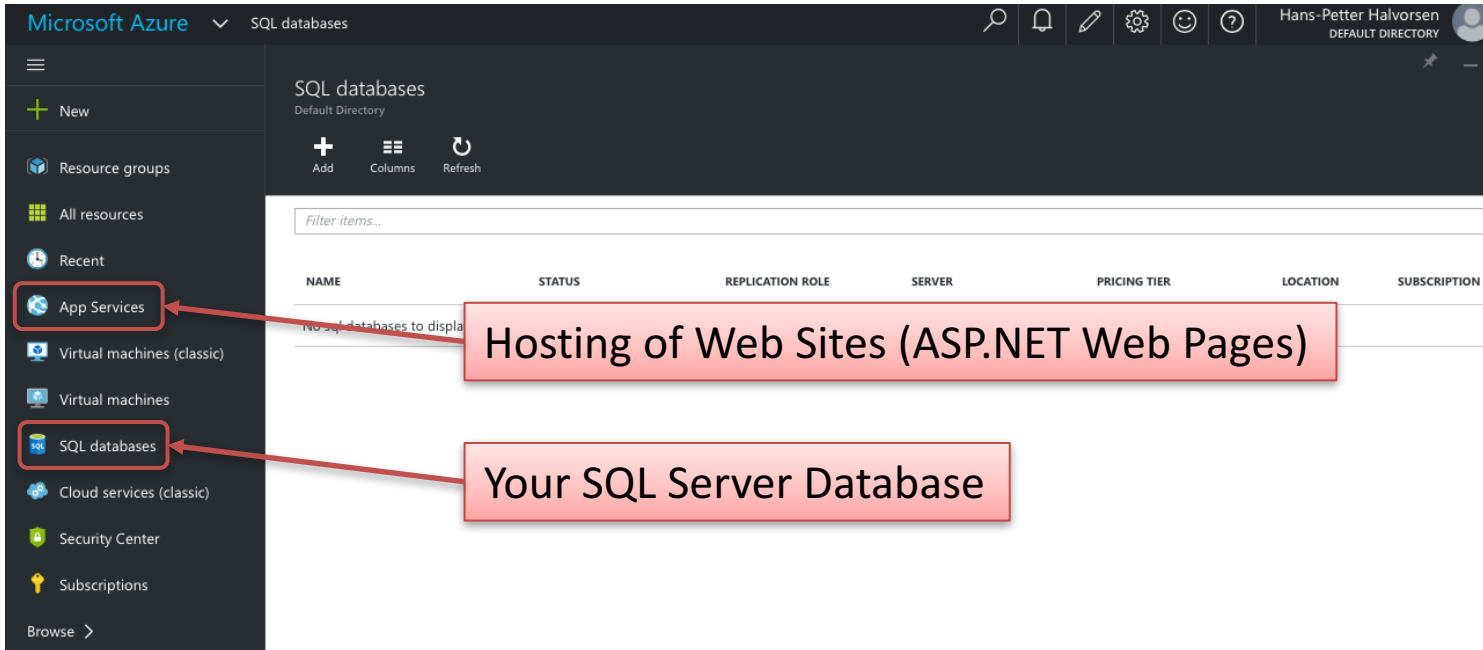
 Subscriptions

Browse >



# Deployment to Microsoft Azure

Microsoft Azure Portal (<https://portal.azure.com>)



The screenshot shows the Microsoft Azure Portal interface. The left sidebar contains a navigation menu with the following items: New, Resource groups, All resources, Recent, App Services, Virtual machines (classic), Virtual machines, SQL databases, Cloud services (classic), Security Center, and Subscriptions. The 'App Services' and 'SQL databases' items are highlighted with red boxes. Red arrows point from these boxes to text labels: 'Hosting of Web Sites (ASP.NET Web Pages)' and 'Your SQL Server Database'. The main content area shows the 'SQL databases' section with a search bar and a table with columns: NAME, STATUS, REPLICATION ROLE, SERVER, PRICING TIER, LOCATION, and SUBSCRIPTION. The table is currently empty, with a message 'No SQL databases to display' visible.

# Create SQL Server Database in Microsoft Azure

The screenshot displays the Microsoft Azure portal interface for creating a new SQL Database. The left-hand navigation pane shows the 'SQL databases' option highlighted with a red box. The main content area is titled 'SQL Database' and contains a form with the following fields and options:

- Name:** A text input field with the placeholder text 'Enter database name'.
- Server:** A link labeled 'Configure required settings'.
- Select source:** A dropdown menu with 'Blank database' selected.
- Pricing tier:** A dropdown menu with 'S0 Standard' selected.
- Optional configuration:** A dropdown menu with 'Collation' selected.
- Resource group:** A dropdown menu with 'Group' selected.
- Subscription:** A dropdown menu with 'Azure Pass' selected.

Below the form, there is a checkbox for 'Pin to dashboard' and a blue 'Create' button.

On the right side, a pricing card for the 'B Basic' tier is shown, featuring a star icon. The card lists the following specifications:

- 5 DTUs**
- Up to 2GB**
- Point In Time Restor...**
- Auditing**

The price is displayed as **35.21** NOK/MONTH (ESTIMATED 31 BASI...).

# Connect to the Microsoft Azure SQL Server from your local SQL Management Studio

1. You connect to the Microsoft Azure SQL Server Database in the same way as you connect to a local Database
2. Note! You Need to Configure Firewall in Microsoft Azure
3. Create Tables, Views, Stored Procedures, etc. -> using a SQL Script is recommended!

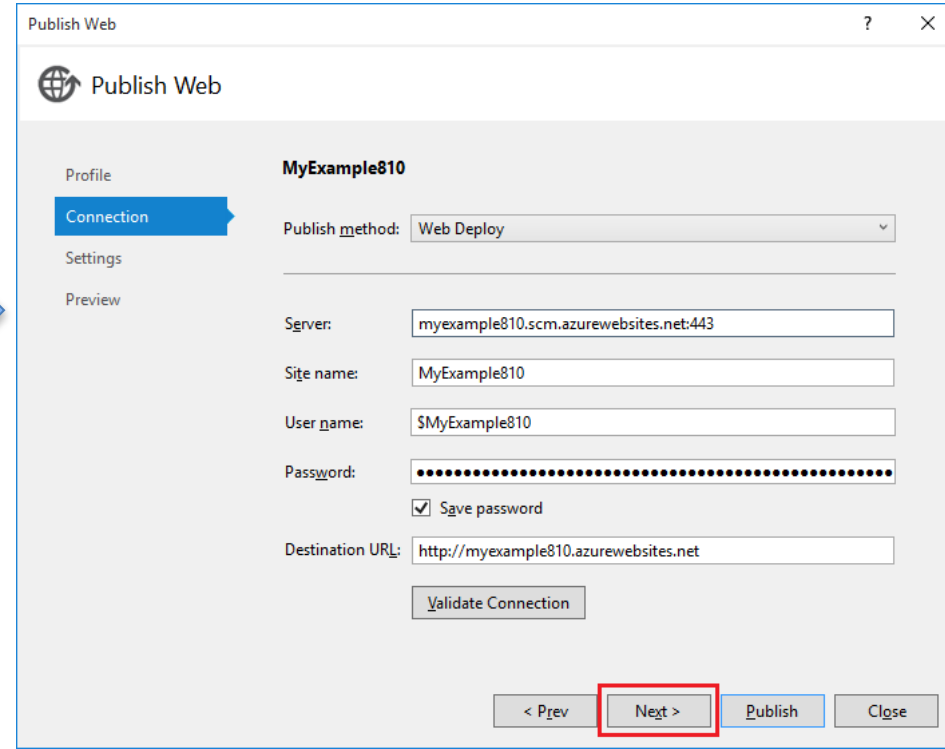
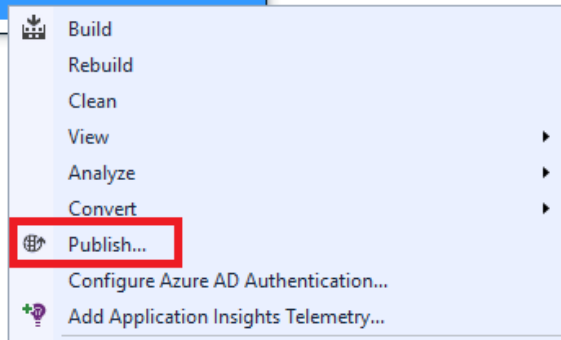
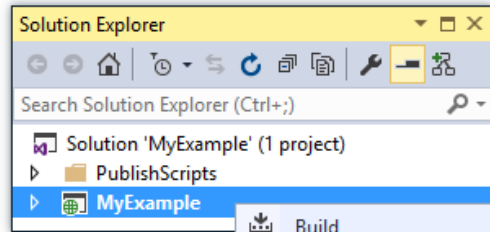
# Create App Service from Azure Portal

The screenshot displays the Azure Portal interface for creating a new Web App. The left-hand navigation pane shows the 'App Services' option highlighted with a red box. The main content area is titled 'Web App' and contains a form with the following fields:

- \* App name:** A text input field with a red border and a placeholder text 'Enter a name for your App'. The domain '.azurewebsites.net' is visible to the right of the input.
- \* Subscription:** A dropdown menu currently set to 'Azure Pass'.
- \* Resource Group:** A dropdown menu currently set to '+ New', with a sub-field for 'New resource group name' below it.
- \* App Service plan/Location:** A dropdown menu currently set to 'ServicePlan85d480b0-8962(Sout...)'.

At the bottom of the form, there is a checkbox for 'Pin to dashboard' and a blue 'Create' button. A large blue overlay on the right side of the image contains the text '<MyWebApp>.azurewebsites.net'.

# Deploy the Web Project to the Azure Web App from Visual Studio



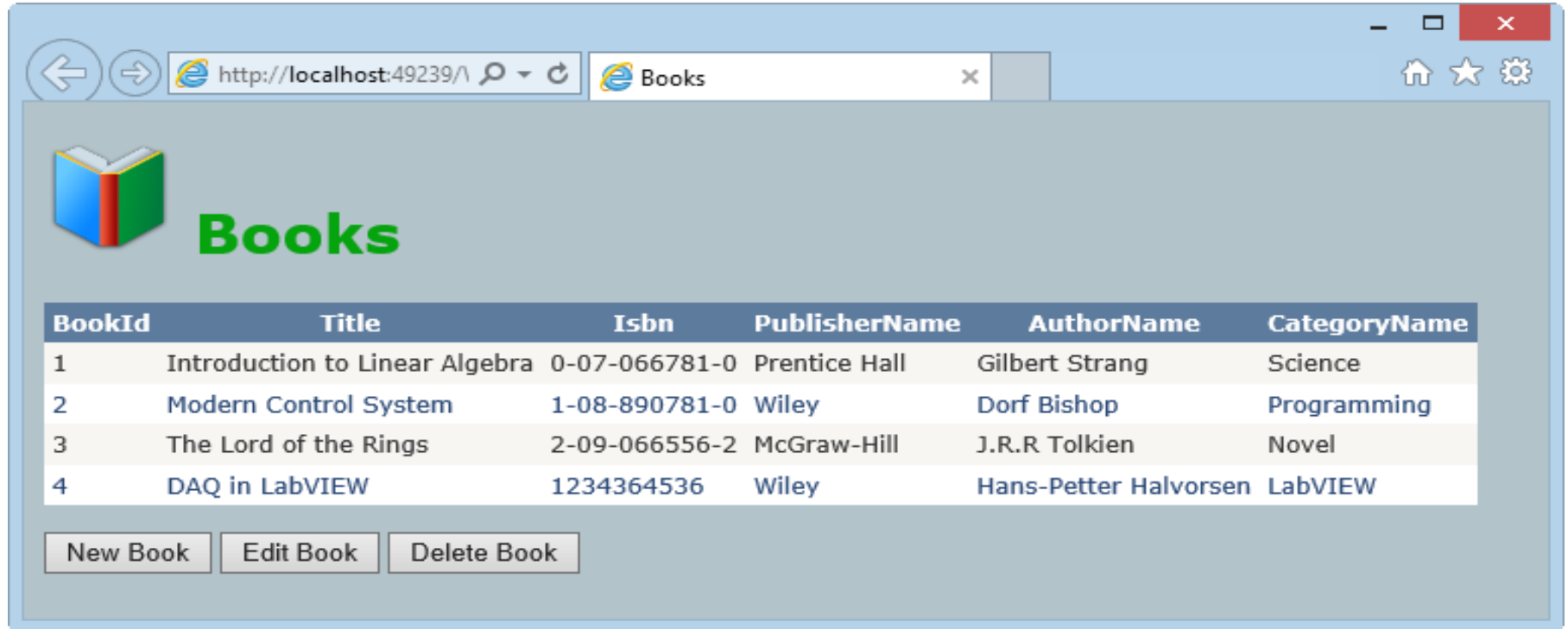
Example 1



# Web App Deployment Example

Hans-Petter Halvorsen, M.Sc.

# ASP.NET Web App




Books

BookId	Title	Isbn	PublisherName	AuthorName	CategoryName
1	Introduction to Linear Algebra	0-07-066781-0	Prentice Hall	Gilbert Strang	Science
2	Modern Control System	1-08-890781-0	Wiley	Dorf Bishop	Programming
3	The Lord of the Rings	2-09-066556-2	McGraw-Hill	J.R.R Tolkien	Novel
4	DAQ in LabVIEW	1234364536	Wiley	Hans-Petter Halvorsen	LabVIEW

New Book Edit Book Delete Book


Browser window: <http://localhost:49239/> Books



# Books

BookId	Title	Isbn	PublisherName	AuthorName	CategoryName
1	Introduction to Linear Algebra	0-07-066781-0	Prentice Hall	Gilbert Strang	Science
2	Modern Control System	1-08-890781-0	Wiley	Dorf Bishop	Programming
3	The Lord of the Rings	2-09-066556-2	McGraw-Hill	J.R.R Tolkien	Novel
4	DAQ in LabVIEW	1234364536	Wiley	Hans-Petter Halvorsen	LabVIEW

Browser window: <http://localhost:49239/> New Book



## New Book

Title:


ISBN:

Publisher:

Author:

Category:

Browser window: <http://localhost:49239/> Edit Book



## Edit Book

Title:

ISBN:

Publisher:

Author:

Category:



Database

# Database

This is our Example Database (SQL Server Designer)

CATEGORY			
	Column Name	Data Type	Allow Nulls
?	CategoryId	int	<input type="checkbox"/>
	CategoryName	varchar(50)	<input type="checkbox"/>
	Description	varchar(1000)	<input checked="" type="checkbox"/>
			<input type="checkbox"/>

PUBLISHER			
	Column Name	Data Type	Allow Nulls
?	PublisherId	int	<input type="checkbox"/>
	PublisherName	varchar(50)	<input type="checkbox"/>
	Description	varchar(1000)	<input checked="" type="checkbox"/>
	Address	varchar(50)	<input checked="" type="checkbox"/>
	Phone	varchar(50)	<input checked="" type="checkbox"/>
	PostCode	varchar(50)	<input checked="" type="checkbox"/>
	PostAddress	varchar(50)	<input checked="" type="checkbox"/>
	EEmail	varchar(50)	<input checked="" type="checkbox"/>
			<input type="checkbox"/>

BOOK			
	Column Name	Data Type	Allow Nulls
?	BookId	int	<input type="checkbox"/>
	Title	varchar(50)	<input type="checkbox"/>
	ISBN	varchar(20)	<input type="checkbox"/>
	PublisherId	int	<input type="checkbox"/>
	AuthorId	int	<input type="checkbox"/>
	CategoryId	int	<input type="checkbox"/>
	Description	varchar(1000)	<input checked="" type="checkbox"/>
	Year	date	<input checked="" type="checkbox"/>
	Edition	int	<input checked="" type="checkbox"/>
	AverageRating	float	<input checked="" type="checkbox"/>
			<input type="checkbox"/>

AUTHOR			
	Column Name	Data Type	Allow Nulls
?	AuthorId	int	<input type="checkbox"/>
	AuthorName	varchar(50)	<input type="checkbox"/>
	Address	varchar(50)	<input checked="" type="checkbox"/>
	Phone	varchar(50)	<input checked="" type="checkbox"/>
	PostCode	varchar(50)	<input checked="" type="checkbox"/>
	PostAddress	varchar(50)	<input checked="" type="checkbox"/>
			<input type="checkbox"/>



# Create Database in Microsoft Azure Portal

The screenshot displays the Microsoft Azure Portal interface for configuring a SQL database. The browser address bar shows the URL: `portal.azure.com/?whr=live.com#resource/subscriptions/c531a2c6-27a2-419f-bdf9-5946613098a0/resourceGroups/Measurement/providers/Microsoft.Sql/servers/...`. The user is logged in as Hans-Petter Halvorsen.

The navigation pane on the left shows the following menu items:

- New
- Resource groups
- All resources
- Recent
- App Services
- Virtual machines (classic)
- Virtual machines
- SQL databases** (highlighted with a red box)
- Cloud services (classic)
- Security Center
- Subscriptions
- Browse >

The main content area is divided into three panes:

- SQL databases** (Default Directory): Shows a list of databases. The **BOOKSYSTEM** database is highlighted with a red box. Below it is the **MEASUREMENTSYSTEM** database.
- BOOKSYSTEM** (SQL database): Shows the database's configuration details under the **Essentials** section.
  - Resource group: Measurement
  - Status: Online
  - Location: North Europe
  - Subscription name: Azure Pass
  - Subscription ID: c531a2c6-27a2-419f-bdf9-5946613098a0
  - Server name: hph.database.windows.net
  - Server version: V12
  - Connection strings: [Show database connection strings](#)
  - Pricing tier: Basic (5 DTUs)
  - Geo-Replication role: Not availableA button labeled **All settings →** is visible at the bottom right of this section.
- Settings** (BOOKSYSTEM): Shows a list of settings categories for the database, including **SUPPORT + TROUBLESHOOTING**, **GENERAL**, and **SECURITY**.

At the bottom of the page, there is a **Monitoring** section with a **Resource utilization** chart. The chart shows a bar graph with a scale from 0% to 100% in 20% increments. The bars are currently empty, indicating no data is displayed. An **Edit** button is located to the right of the chart.

# Connect to Microsoft Azure Database from Local Computer

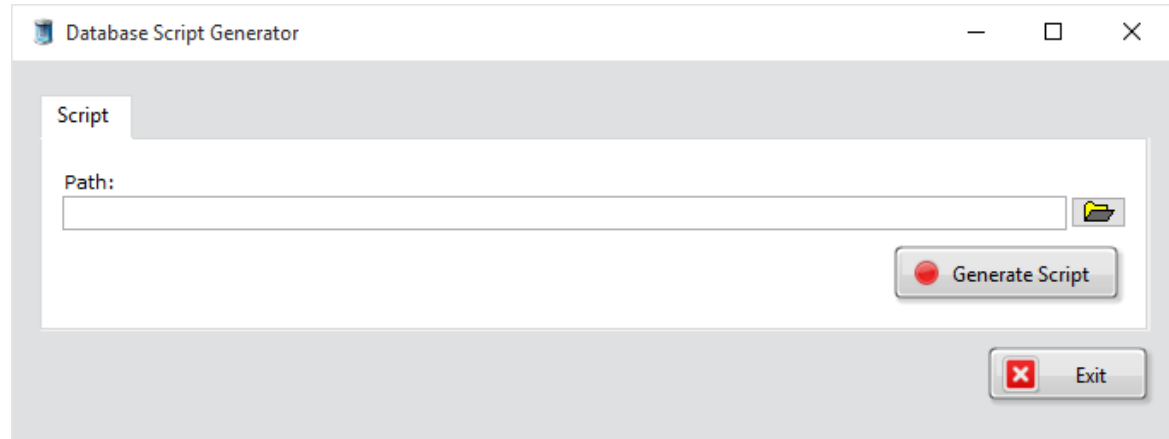
The screenshot displays the Microsoft SQL Server Management Studio (SSMS) interface. The 'Object Explorer' on the left shows the 'MEASUREMENTSYSTEM' database structure, including tables like 'dbo.MEASUREMENTDATA'. The central 'Query Editor' window shows a SQL query: `select * from MEASUREMENTDATA`. The 'Results' pane at the bottom displays the query output as a table with 11 rows and 6 columns: MeasurementId, Measurement Time Stamp, SensorId, MeasurementValue, and FahrenheitValue. The 'Properties' pane on the right shows connection details for 'hph.database.windows.net'. The status bar at the bottom indicates the query was executed successfully, returning 20 rows.

MeasurementId	Measurement Time Stamp	SensorId	MeasurementValue	FahrenheitValue
1	2016-04-08 10:57:20.830	1	23,9	75,02
2	2016-04-08 10:57:21.273	1	23,8	74,84
3	2016-04-08 10:57:22.273	1	23,8	74,84
4	2016-04-08 10:57:23.267	1	23,9	75,02
5	2016-04-08 10:57:24.277	1	25	77
6	2016-04-08 10:57:25.277	1	26,2	79,16
7	2016-04-08 10:57:26.273	1	27	80,6
8	2016-04-08 10:57:27.273	1	27,2	80,96
9	2016-04-08 10:57:28.273	1	27,3	81,14
10	2016-04-08 10:57:29.280	1	27,2	80,96
11	2016-04-08 10:57:30.277	1	27,3	81,14

# Database

Since all necessary Tables, Views, Stored Procedures, etc. already are stored in one single SQL File it is easy to Deploy the Database to the Microsoft Azure Database

- Functions
- Scripts
- Stored Procedures
- Tables
- Triggers
- Views



# Deploy Web App

# Create App Service

The screenshot displays the Microsoft Azure portal interface. The left sidebar shows the navigation menu with 'App Services' highlighted. The main content area shows the 'bookshph' App Service overview, including its status (Running), location (South Central US), and various settings. The 'Application settings' panel is open on the right, showing configuration options for the App Service.

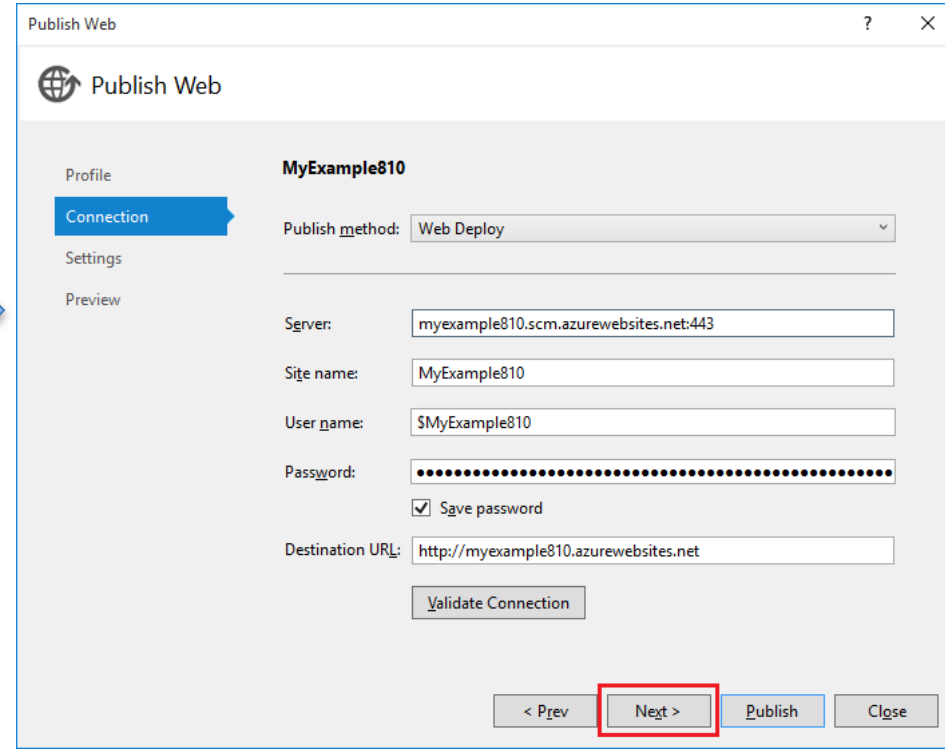
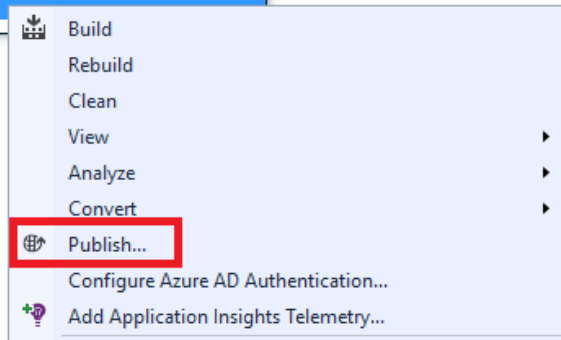
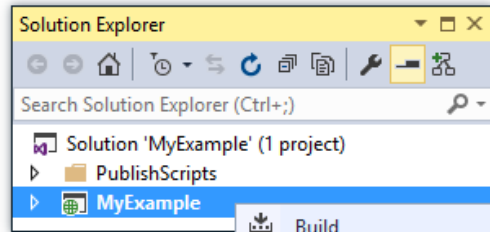
**Application Settings Overview:**

- GENERAL**
  - Quick start
  - Properties
  - Application settings
- APP SERVICE PLAN**
  - App Service Plan
  - Scale Up (App Service Plan)
  - Scale Out (App Service Plan)
  - Change App Service plan
- PUBLISHING**
  - Deployment Source
  - Deployment slots
  - Deployment credentials
- API**
  - API definition
  - CORS

**Monitoring:** Requests and errors graph showing a spike in requests at 11 AM.

Time	Requests	HTTP Server Errors
10:15 AM	0	0
10:30 AM	0	0
10:45 AM	0	0
11 AM	2	0

# Deploy the Web Project to the Azure Web App from Visual Studio





# Web.config

- Since the Connection String already is stored in Web.Config, it is easy to change the Connection string according to the Microsoft Azure Database

# Default Documents

The screenshot displays the Microsoft Azure portal interface for an App Service web application named 'bookshph'. The 'Application settings' page is open, showing various configuration options. Two red boxes highlight the 'Application settings' link in the 'Properties' section and the 'Default documents' section, which lists 'Index.aspx' as the default document. The 'Monitoring' section shows a graph of requests and errors, with 0 HTTP server errors and 2 requests recorded between 10:15 AM and 11 AM. The 'App settings' section shows the 'WEBSITE\_NODE\_DEFAULT\_VERSION' set to 4.2.3. The 'Virtual applications and directories' section shows the root path '/' mapped to 'site\wwwroot'.

Application settings - M x +  
portal.azure.com/?whr=live.com#resource/subscriptions/c531a2c6-27a2-419f-bdf9-5946613098a0/resourceGroups/Measurement/providers/Microsoft.Web/sites/bookshph

Hans-Petter

Microsoft Azure > App Services > bookshph > Settings > Application settings

Search resources

Hans-Petter Halvorsen  
DEFAULT DIRECTORY

App Services  
Default Directory

bookshph  
Web app

Essentials

Resource group: Measurement  
URL: http://bookshph.azurewebsites.net  
Status: Running  
Location: South Central US  
Subscription name: Azure Pass  
Subscription ID: c531a2c6-27a2-419f-bdf9-5946613098a0

Monitoring

Requests and errors

0 HTTP SERVER ERRORS  
2 REQUESTS

Settings

GENERAL

Properties

Application settings

APP SERVICE PLAN

PUBLISHING

API

Application settings

App settings

WEBSITE\_NODE\_DEFAULT\_V... 4.2.3

Connection strings

No results

Default documents

Index.aspx

Handler mappings


No results

Virtual applications and directories

/ site\wwwroot

# Finished

Start Page:  
Index.aspx -> This page again redirects to /WebPages/Books.aspx

 **Books**

BookId	Title	Isbn	PublisherName	AuthorName	CategoryName
1	Introduction to Linear Algebra	0-07-066781-0	Prentice Hall	Gilbert Strang	Science
2	Modern Control System	1-08-890781-0	Wiley	Dorf Bishop	Programming
3	The Lord of the Rings	2-09-066556-2	McGraw-Hill	J.R.R Tolkien	Novel

## Example 2



<https://www.youtube.com/watch?v=xAZm--SshKw>

# Datalogging and Monitoring Example

Hans-Petter Halvorsen, M.Sc.

# System Overview

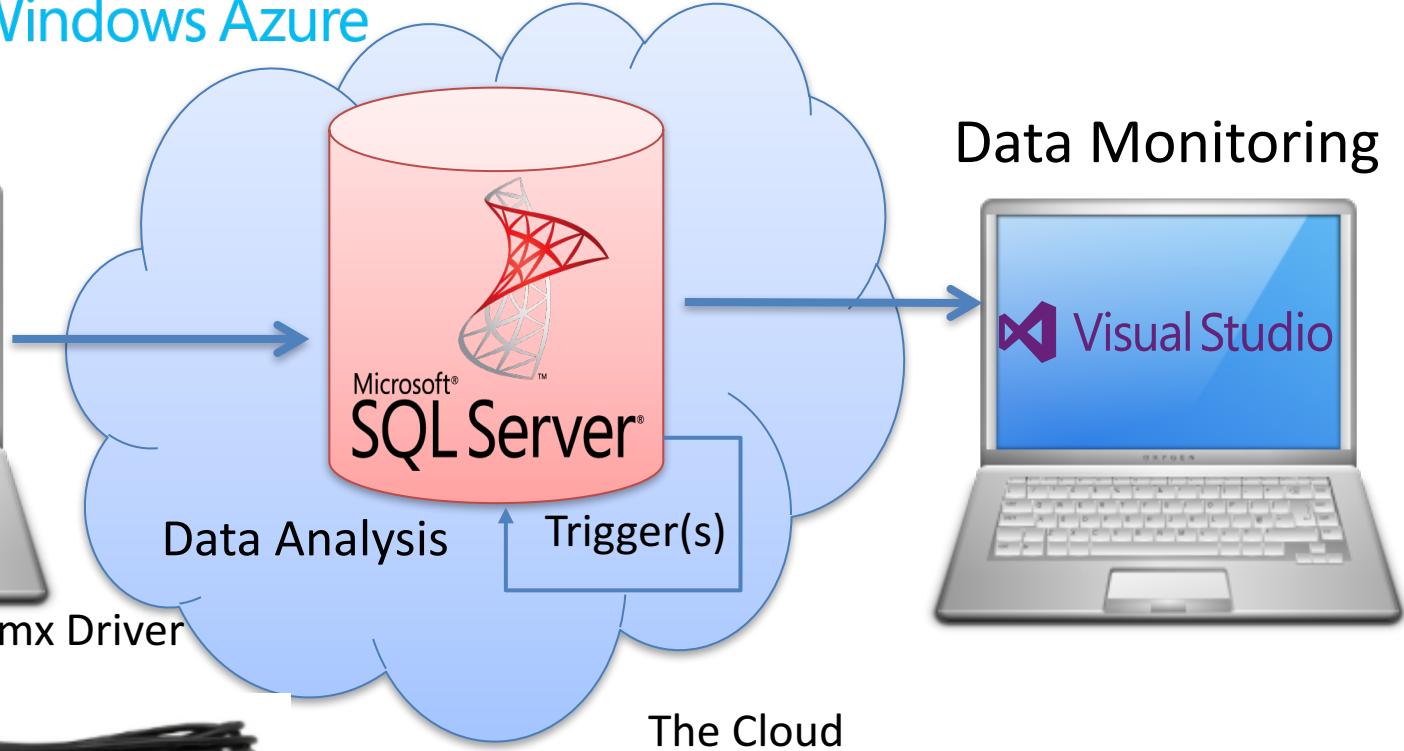


Data Logging



DAQmx Driver

DAQ



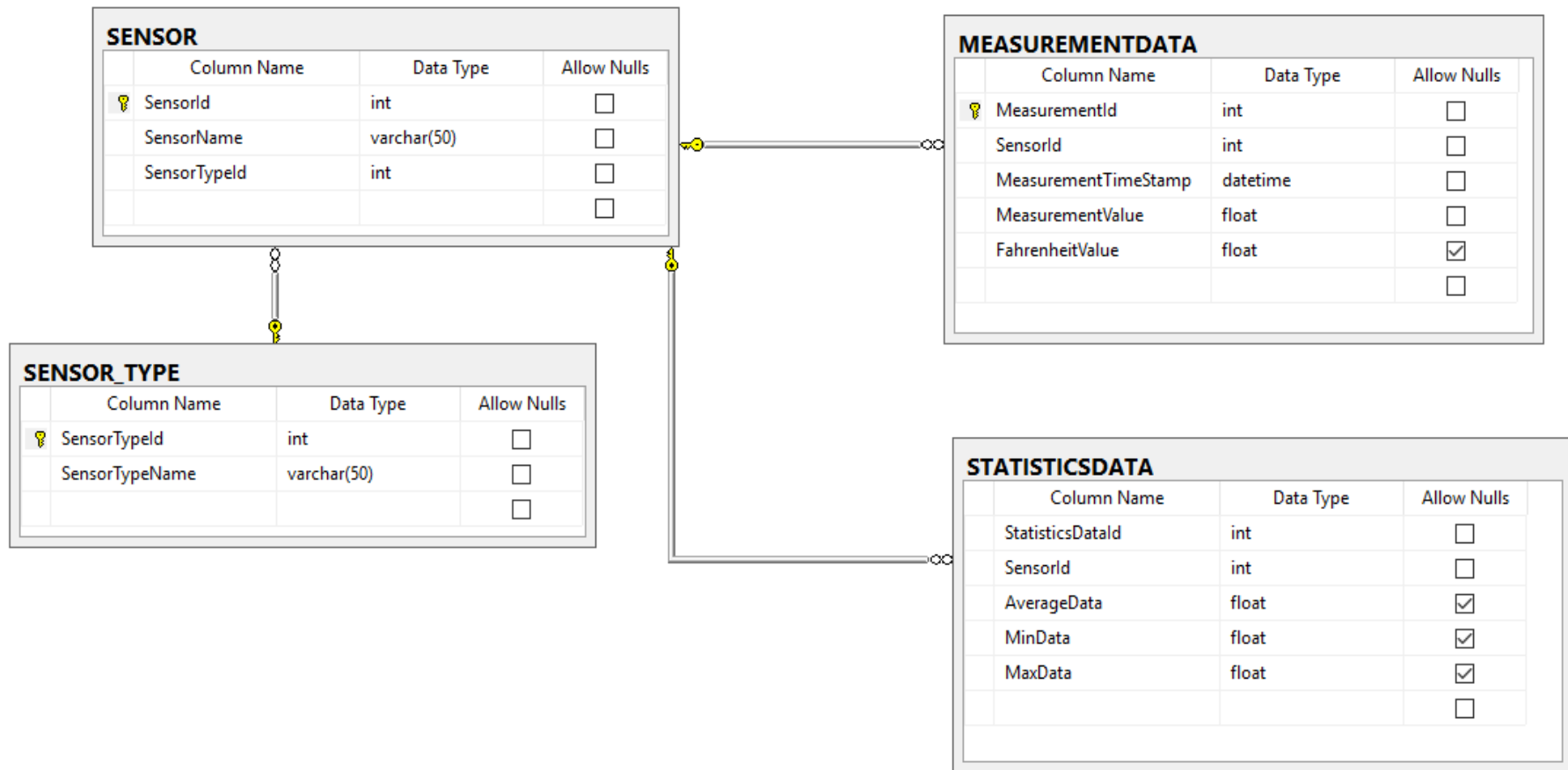
Data Monitoring



The Cloud

Database

# Database



# Create Database in Microsoft Azure Portal

The screenshot displays the Microsoft Azure Portal interface. The left sidebar shows the navigation menu with 'SQL databases' highlighted. The main content area is divided into three panes:

- SQL databases (Default Directory):** A list of databases with 'MEASUREMENTSYSTEM' highlighted.
- BOOKSYSTEM (SQL database):** The 'Essentials' section displays the following details:
  - Resource group: Measurement
  - Status: Online
  - Location: North Europe
  - Subscription name: Azure Pass
  - Subscription ID: c531a2c6-27a2-419f-bdf9-5946613098a0
  - Server name: hph.database.windows.net
  - Server version: V12
  - Connection strings: Show database connection strings
  - Pricing tier: Basic (5 DTUs)
  - Geo-Replication role: Not available
- Monitoring:** A 'Resource utilization' chart showing a bar graph with values from 20% to 100%.

The right pane shows the 'Settings' section for the 'BOOKSYSTEM' database, with a search bar and various configuration options under 'SUPPORT + TROUBLESHOOTING' and 'GENERAL'.



# Connect to Microsoft Azure Database from Local Computer

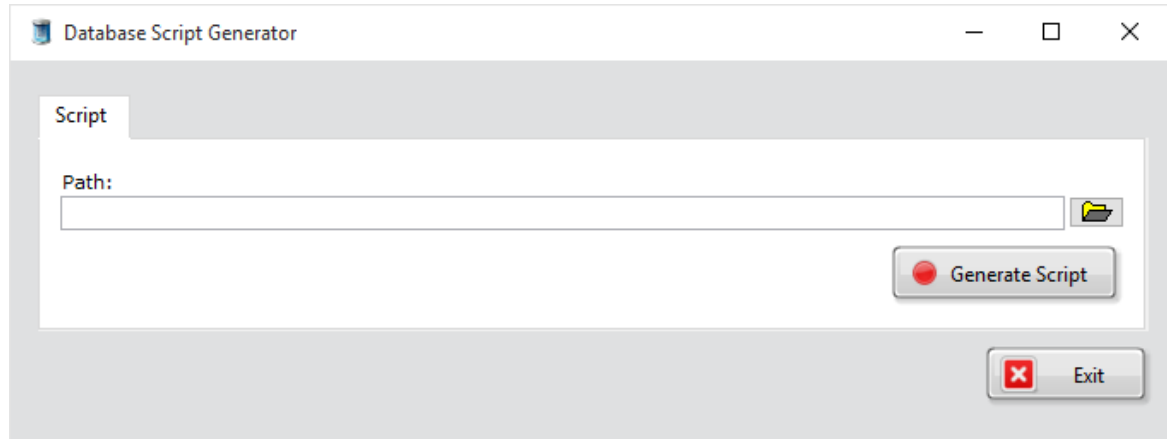
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11	2016-04-08 10:57:30.277	1	27,3	81,14

# Database

Since all necessary Tables, Views, Stored Procedures, etc. already are stored in one single SQL File it is easy to Deploy the Database to the Microsoft Azure Database

- Functions
- Scripts
- Stored Procedures
- Tables
- Triggers
- Views

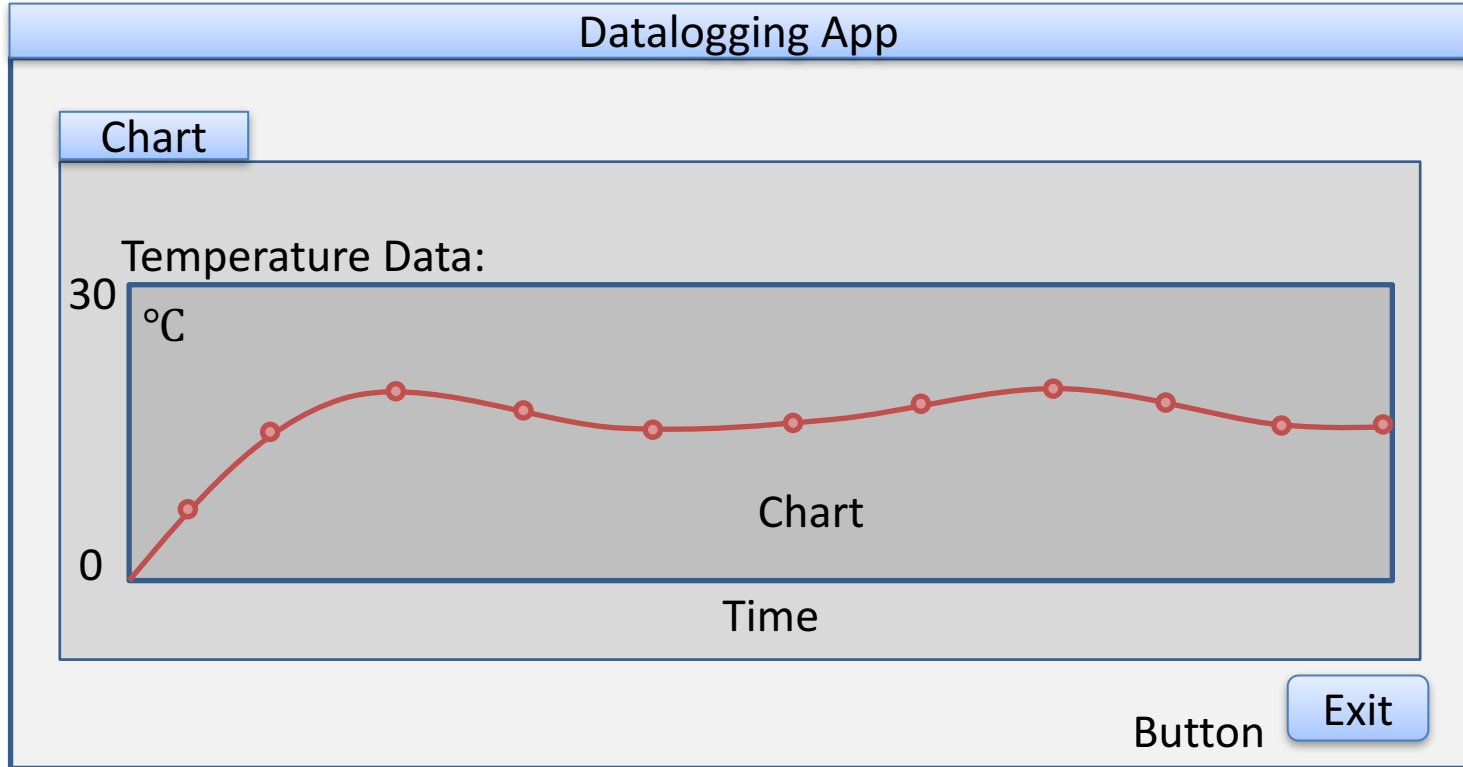


# Datalogging App

Store Measurement Data in the Cloud (Microsoft Azure)

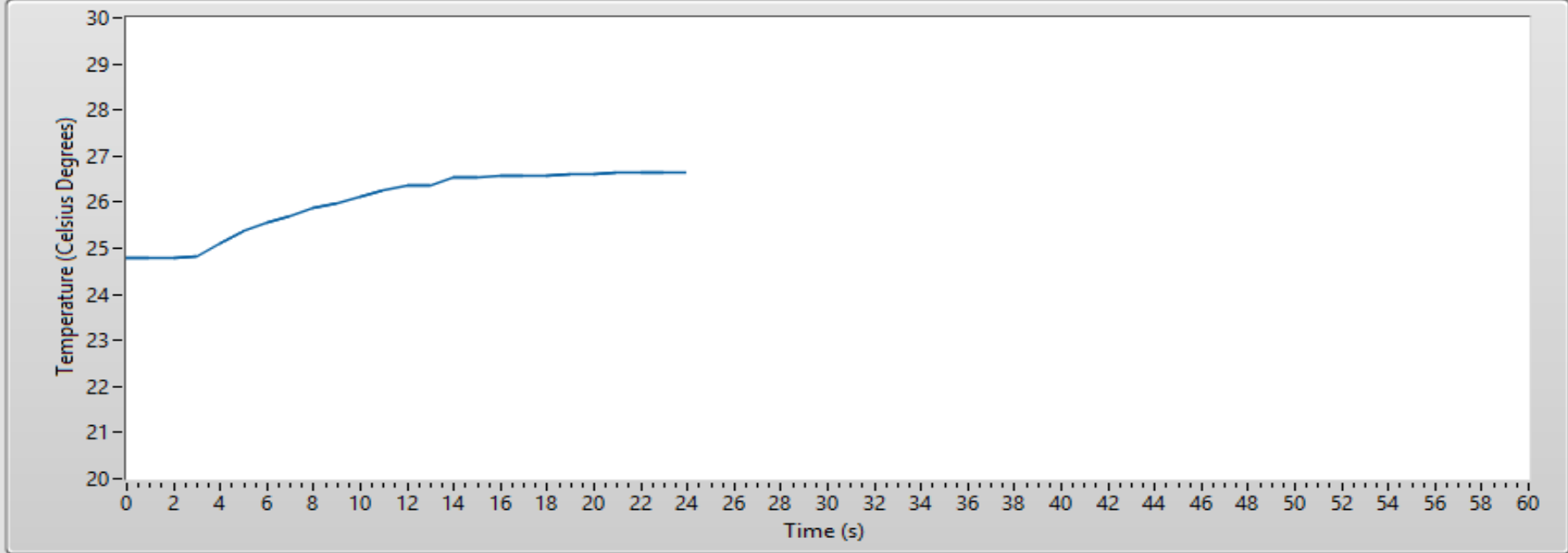
# LabVIEW HMI Example

The Temperature Data from the TC-01 DAQ device should be stored in the Database.



Waveform Chart

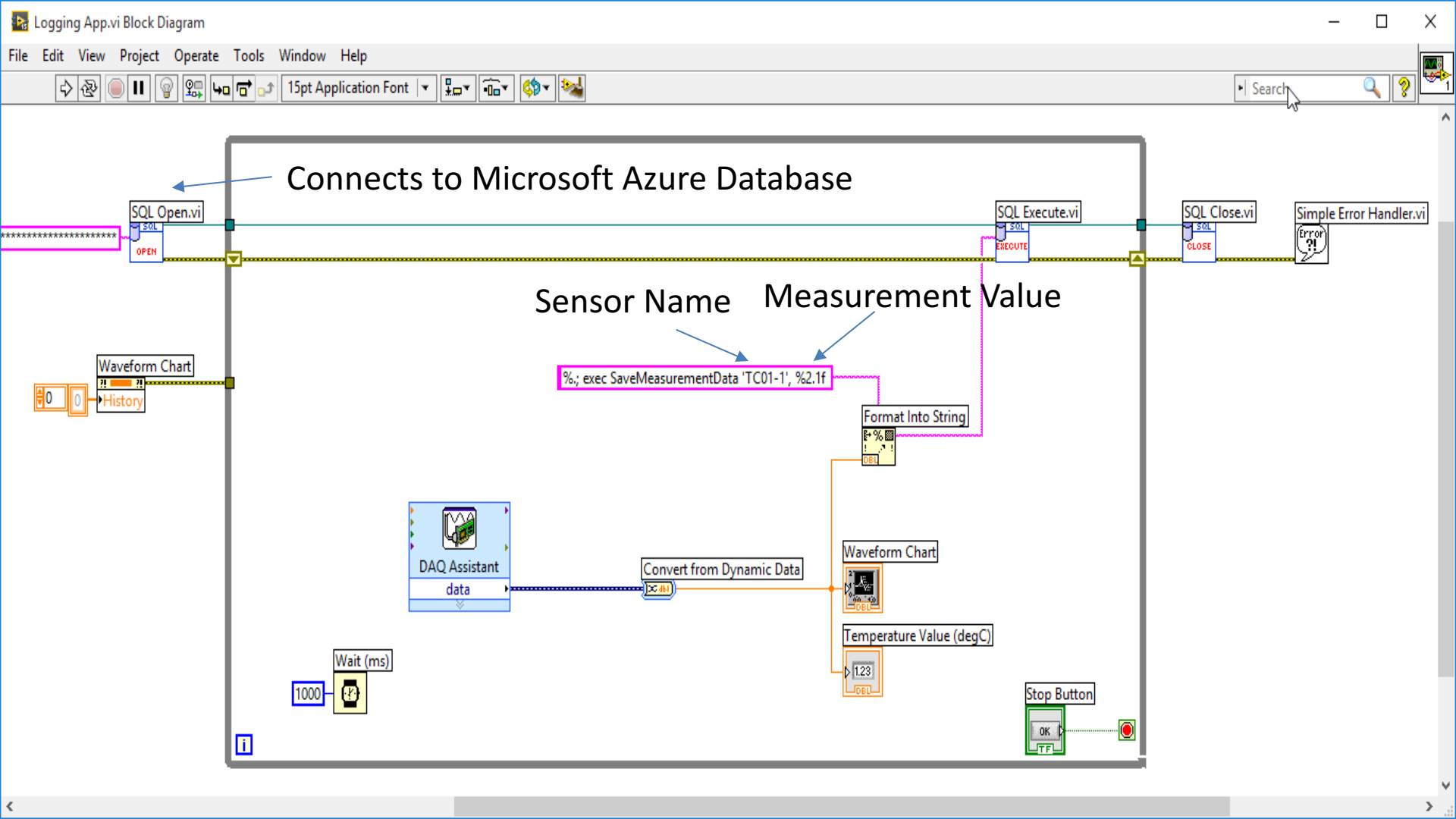
Plot 0 [Line Icon]



Temperature Value (degC)

26,7

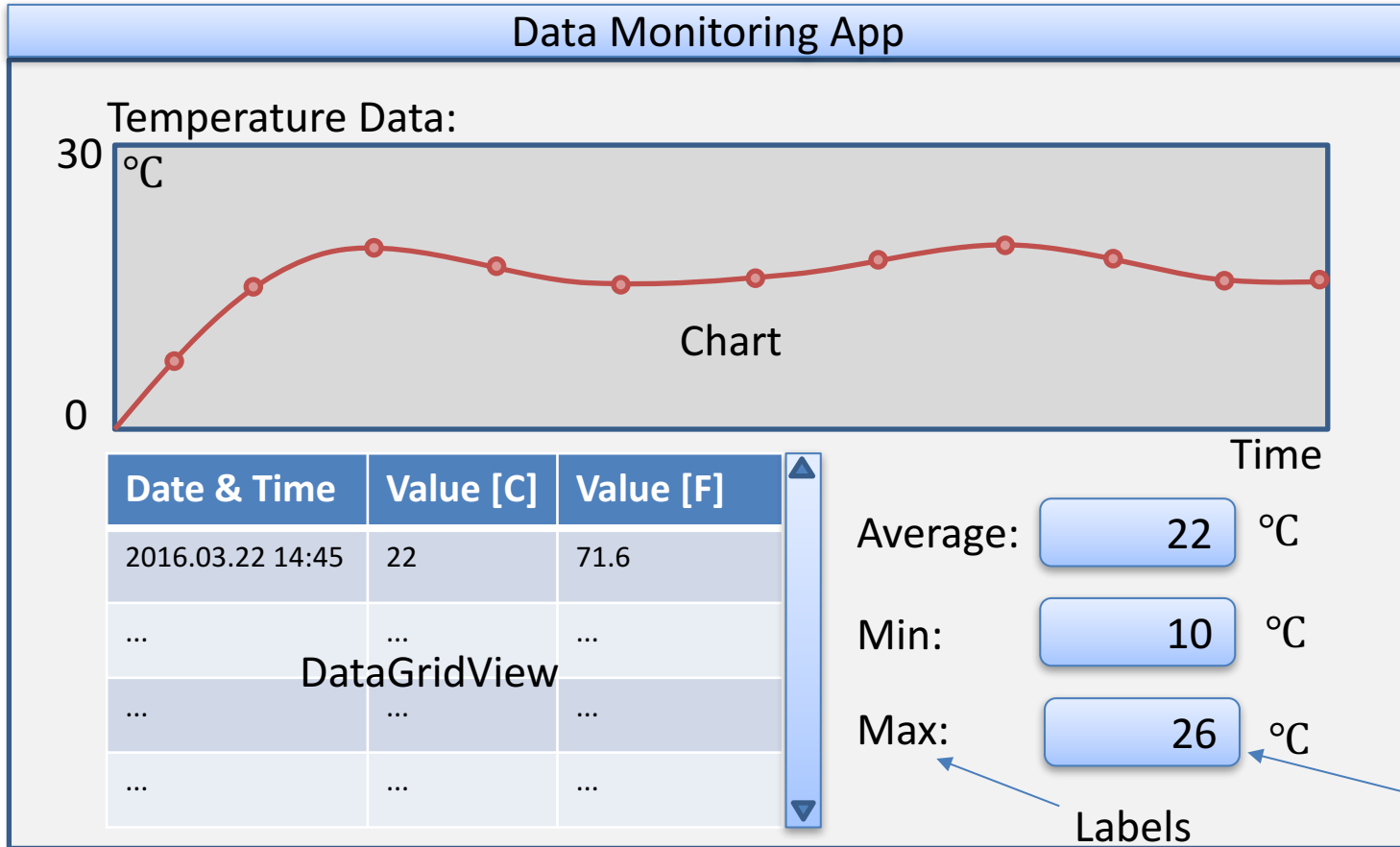
■ Stop



# Monitoring App

Getting Measurement and Analysis Data from the Cloud (Microsoft Azure)

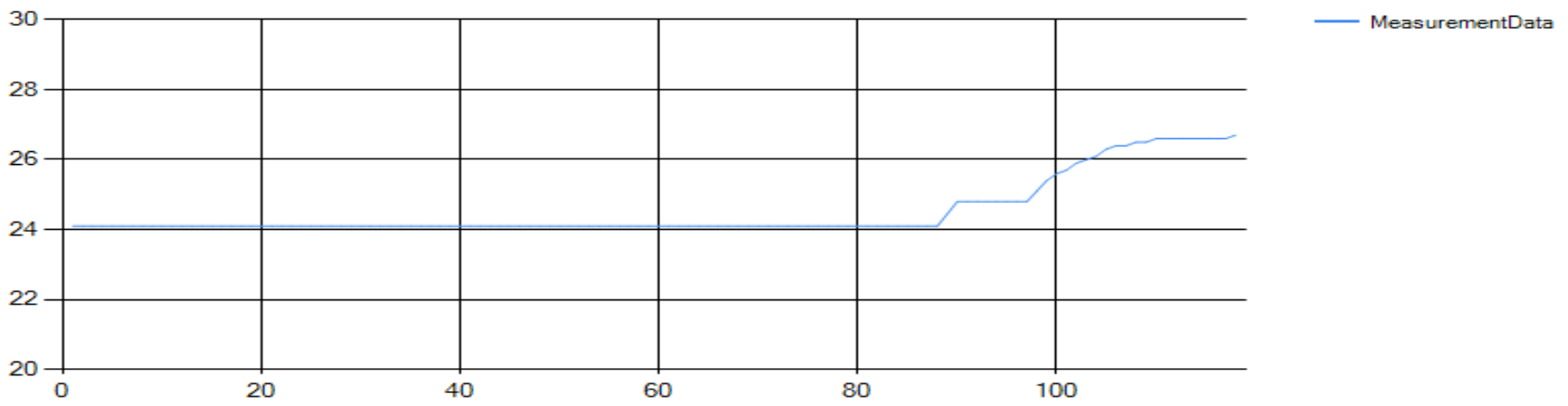
# Visual Studio HMI Example



You should get the Data from the Database

Typically you get Data from the Database using Views and/or Stored Procedures





	MeasurementId	MeasurementTimeStamp	MeasurementValue	FahrenheitValue	^
▶	1	07.04.2016 10.44	24,1	75,38	
	2	07.04.2016 10.44	24,1	75,38	
	3	07.04.2016 10.44	24,1	75,38	
	4	07.04.2016 10.44	24,1	75,38	
	5	07.04.2016 10.44	24,1	75,38	
	6	07.04.2016 10.44	24,1	75,38	
	7	07.04.2016 10.44	24,1	75,38	
	8	07.04.2016 10.44	24,1	75,38	
	9	07.04.2016 10.44	24,1	75,38	
	10	07.04.2016 10.44	24,1	75,38	
	11	07.04.2016 10.44	24,1	75,38	
	12	07.04.2016 10.44	24,1	75,38	
	13	07.04.2016 10.44	24,1	75,38	▼

Statistics Data

Min:

Max:

Average:

# App.config

- Since the Connection String already is stored in App.Config, it is easy to change the Connection string according to the Microsoft Azure Database

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