Cognizant CLOUD SERVICES

Blueprint – Azure SQL Database

Revision History

Date	Version	Author	Reviewer(s)	Comments
6-Aug-2018	1.0	Ankit	Tressa	Initial Draft

Contents

1. Scope

This document provides the blueprint for the Azure SQL Database PaaS service offered by Azure. This contains the below.

1. Service Usage
2. Provisioning Scripts
3. Support Objectives
4. Monitoring metrics
5. Monitoring Setup Scripts

2. Overview

Azure SQL Database is a relational database-as-a service using the Microsoft SQL Server Engine. SQL Database is a high-performance, reliable, and secure database you can use to build data-driven applications and websites in the programming language of your choice, without needing to manage infrastructure. More details are available at https://docs.microsoft.com/en-us/azure/sql-database/sql-database-technical-overview.

3. Service Usage

3.1 Best Practices

- As far as possible, the DB admin must be an Azure Active Directory user or group.
- Local database account passwords must be rotated periodically
- Transparent Data Encryption, Threat Detection & Server level audit must be enabled on the Azure SQL Server
- Diagnostic settings must be enabled on the Azure SQL DB instance
- Connections strings must not be stored unencrypted in either configuration files or code
- For Business continuity and high availability, enable auto failover groups
- Active Geo Replication to be enabled for Azure SQL instances for apps deployed across regions, which require read only access
- Use Azure SQL Vulnerability assessment tool periodically to discover, track and remediate potential database vulnerabilities (https://docs.microsoft.com/en-us/azure/sql-database/sql-vulnerability-assessment). Run the tool in non-prod environments and fix the DB before moving to production. Once moved to production, create a baseline and then run this tool to periodically to check for any deviations from the baseline.

3.2 Service Connectivity

Firewall rules to be applied to the Azure SQL server to allow traffic from IP addresses

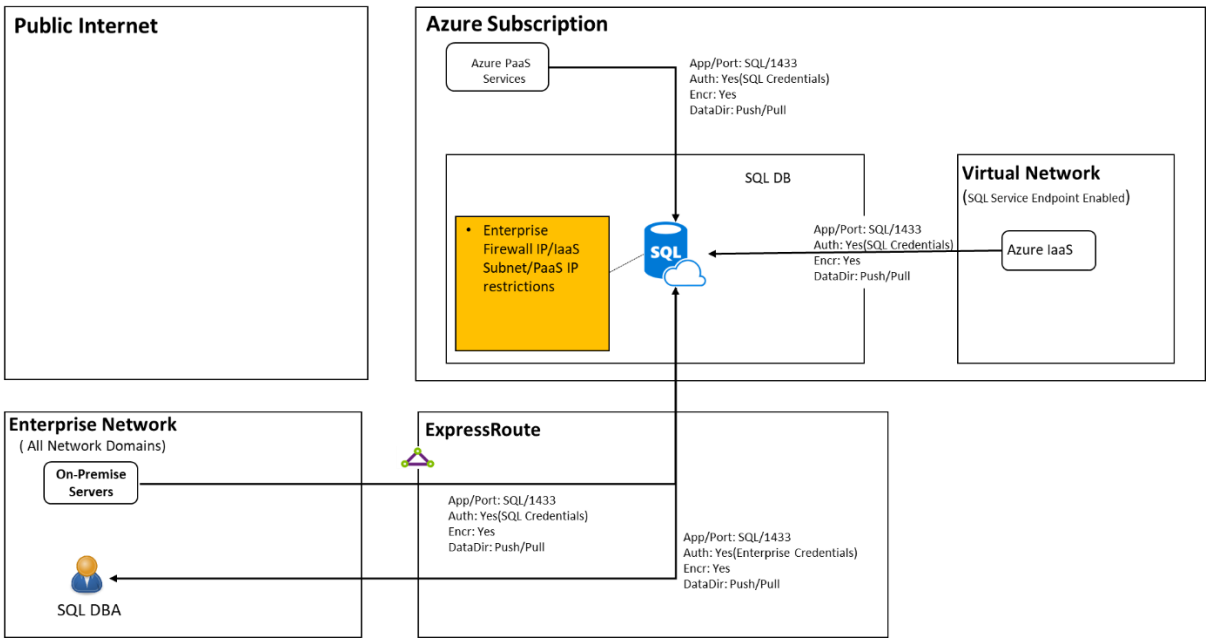
3.3 Microsoft SLA

Microsoft guarantee at least 99.99% of the time customers will have connectivity between their Basic, Standard, or Premium Microsoft Azure SQL Database and the customer's Internet gateway.

3.4 Recommended tiers for enterprise usage

Depends on DTU & space requirements

3.5 Service Usage Diagram



4. SQL database Provisioning Script

The below ARM template is to be used to provision an instance of the service.

This consists of the below parameters

Parameter Name	Description
Database Name	The Name of the Database
Collation	Database collation defines the rules that sort and compare data, and cannot be changed

	after database creation. The default database collation is SQL_Latin1_General_CP1_CI_AS. See the SQL Database quick start blade for more information about database collations.
Edition	Select Pricing Tier
RequestedServiceObjectiveName	
Server Name	The name of Existing SqlServer to host the database.
MaxSizeBytes	The Maximum size of the database.
Tag Values	Service Tags for the resource to categories

Template Script

```
{
  "$schema": "http://schema.management.azure.com/schemas/2014-04-01-
preview/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "collation": {
      "type": "string",
      "defaultValue": "SQL_Latin1_General_CP1_CI_AS"
    },
    "databaseName": {
      "type": "string"
    },
    "edition": {
      "type": "string",
      "defaultValue": "Standard"
    },
    "requestedServiceObjectiveName": {
      "type": "string",
      "defaultValue": "S1"
    },
    "maxSizeBytes": {
      "type": "string",
      "defaultValue": "268435456000"
    },
    "serverName": {
      "type": "string"
    },
    "serverLocation": {
      "type": "string",
      "defaultValue": "South Central US",
      "allowedValues": [
        "South Central US",
        "North Central US"
      ]
    }
  },
```

```
  "resources": [
    {
      "type": "Microsoft.Sql/servers/databases",
      "apiVersion": "2014-04-01-preview",
      "location": "[parameters('serverLocation')]",
      "name": "[concat(parameters('serverName'), '/',
parameters('databaseName'))]",
      "properties": {
        "collation": "[parameters('collation')]",
        "edition": "[parameters('edition')]",
        "maxSizeBytes": "[parameters('maxSizeBytes')]",
        "requestedServiceObjectiveName":
"[parameters('requestedServiceObjectiveName')]"
      }
    }
  ]
}
```

5. SQL Server Provisioning Script

The below ARM template is to be used to provision an instance of the service.

This consists of the below parameters

Parameter Name	Description
SQLServerName	The name of the Server
SQLAdministratorLogin	Administrator Login Username
SQLAdministratorLoginPassword	Administrator Login Password
Tag Values	Service Tags for the resource to categories

Template Script

```
{
  "$schema": "http://schema.management.azure.com/schemas/2015-01-
01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
    "sqlServerName": {
      "type": "string",
      "metadata": {
        "description": "The name of the database server."
      }
    },
    "sqlAdministratorLogin": {
```

```
      "type": "string",
      "metadata": {
        "description": "The administrator username of the SQL Server."
      }
    },
    "sqlAdministratorLoginPassword": {
      "type": "securestring",
      "metadata": {
        "description": "The administrator password of the SQL Server."
      }
    },
    "TagValues": {
      "defaultValue": {
        "Tag1Name": "Tag1Value",
        "Tag2Name": "Tag2Value"
      },
      "type": "object"
    }
  },
  "resources": [
    {
      "name": "[parameters('sqlServerName')]",
      "type": "Microsoft.Sql/servers",
      "apiVersion": "2014-04-01-preview",
      "location": "[resourceGroup().location]",
      "tags": "[parameters('TagValues')]",
      "properties": {
        "administratorLogin": "[parameters('sqlAdministratorLogin')]",
        "administratorLoginPassword":
"[parameters('sqlAdministratorLoginPassword')]",
        "version": "12.0"
      }
    }
  ],
  "outputs": {
    "sqlServerFqdn": {
      "type": "string",
      "value": "[reference(concat('Microsoft.Sql/servers/',
parameters('sqlServerName'))).fullyQualifiedDomainName]"
    }
  }
}
```

6. Support Objectives

Below are the objectives to be fulfilled while providing support for Azure SQL database instances.

1. Provision Azure SQL Server & database
2. De-Provision Azure SQL database
3. De-Provision Azure SQL database server
4. Onboarding Existing SQL DB
5. Modifying SQL DB firewall management
6. Scale Up SQL DB

7. SQL DB Disaster Recovery Setup
8. Restore DB
9. Request for Azure SQL Admin Account Password Reset
10. Request for Manual Failover Trigger

7. Monitoring Metrics

This section details the metrics which are to be monitored for instances of SQL Database.

7.1 Recommended Metrics

The following metrics are recommended to be enabled by default.

Metrics	Category	Operator Type	Threshold	Unit	Frequency in Mins/Hrs
Blocked by Firewall	Information	>	Production: 3 Development: 5	Count	5M
Failed Connections	Information	>=	Production: 3 Development: 5	Count	5M
CPU percentage	Performance	>	Production: 65 Development: 80	Percent	5M
Deadlocks	Information	>=	Production: 1 Development: 2	Count	5M
DTU percentage	Performance	>	Production:65 Development: 80	Percent	5M
Database size percentage	Performance	>	Production: 65 Development: 80	Percent	5M

7.2 Optional Metrics

The following monitoring metrics are optional and can be enabled on a need basis

Metrics	Category	Operator Type	Threshold	Unit	Frequency in Mins/Hrs
Successful Connections	Information	>=	0	Count	5M
DTU Limit	Performance	>	**Production:** 7 **Development:**10	Count	1H
DTU used	Performance	>	**Production:** 7 **Development:** 10	Count	1H
Log IO percentage	Performance	>=	**Production:** 7 **Development:** 10	Percent	1H
Data IO percentage	Performance	>=	**Production:** 65 **Development:** 80	Percent	5M
Sessions percentage	Performance	>	**Production:** 65 **Development:** 80	Percent	5M
Total database size	Information	>	**< 1 TB size** **Production:** 65 **Development:** 80 >= 1 TB size 100 GB left	Percent	1H
Workers percentage	Information	>	**Production:** 65 **Development:** 80	Percent	5M
In-Memory OLTP storage percentage	Performance	>	**Production:** 7 **Development:** 10	Percent	5M

8. Monitoring Metrics Setup Script

This section provides a single script which can setup all the recommended metrics for monitoring.

```
{
  "$schema": "https://schema.management.azure.com/schemas/2015-01-
01/deploymentTemplate.json#",
  "contentVersion": "1.0.0.0",
  "parameters": {
```

```
"Alertname-DeadLock": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"Alertname-CPU": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"Alertname-Blocked by Firewall": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"Alertname-DTU percentage": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"Alertname-DTU used": {
  "type": "string",
  "metadata": {
    "description": "Name of alert"
  }
},
"Alertname-Failed Connections": {
  "type": "string",
  "metadata": {
```

```
        "description": "Name of alert"
      }
    },
    "SubscriptionName": {
      "type": "string",
      "metadata": {
        "description": "Name of the subscription"
      }
    },
    "alertDescription": {
      "type": "string",
      "defaultValue": "",
      "metadata": {
        "description": "Description of alert"
      }
    },
    "isEnabled": {
      "type": "bool",
      "defaultValue": true,
      "metadata": {
        "description": "Specifies whether alerts are enabled"
      }
    },
    "resourceId": {
      "type": "string",
      "defaultValue": "",

      "metadata": {
        "description": "Resource ID of the resource emitting the metric that will
be used for the comparison."
      }
    },
    "sendToServiceOwners": {
```

```
      "type": "bool",
      "defaultValue": false,
      "metadata": {
        "description": "Specifies whether alerts are sent to service owners"
      }
    }
  },
  "variables": {
    "operator": "GreaterThanOrEqualTo",
    "threshold": "2",
    "windowSize": "PT10M",
    "timeAggregation": "Total"

  },
  "resources": [
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-DeadLock')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-DeadLock')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "deadlock"
          },
          "operator": "[variables('operator')]",
```

```
          "threshold": "[variables('threshold')]",
          "windowSize": "[variables('windowSize')]",
          "timeAggregation": "[variables('timeAggregation')]"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Info",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-CPU')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-CPU')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
```

```
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "cpu_percent"
          },
          "operator": "GreaterThan",
          "threshold": "80",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-Blocked by Firewall')]",
```

```
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-Blocked by Firewall')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "blocked_by_firewall"
          },
          "operator": "GreaterThan",
          "threshold": "5",
          "windowSize": "PT5M",
          "timeAggregation": "Total"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Error",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
```

```
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-DTU percentage')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-DTU percentage')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "dtu_consumption_percent"
          },
          "operator": "GreaterThan",
          "threshold": "80",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
```

```
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-DTU used')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-DTU used')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "dtu_used"
          },
          "operator": "GreaterThan",
          "threshold": "8",
          "windowSize": "PT5M",
          "timeAggregation": "Average"
```

```
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    },
    {
      "type": "Microsoft.Insights/alertRules",
      "name": "[parameters('Alertname-Failed Connections')]",
      "location": "[resourceGroup().location]",
      "apiVersion": "2016-03-01",
      "properties": {
        "name": "[parameters('Alertname-Failed Connections')]",
        "description": "[parameters('alertDescription')]",
        "isEnabled": "[parameters('isEnabled')]",
        "condition": {
          "odata.type":
"Microsoft.Azure.Management.Insights.Models.ThresholdRuleCondition",
          "dataSource": {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleMetricDataSource",
```

```
            "resourceUri": "[parameters('resourceId')]",
            "metricName": "connection_failed"
          },
          "operator": "GreaterThan",
          "threshold": "5",
          "windowSize": "PT5M",
          "timeAggregation": "Total"
        },
        "actions": [
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleEmailAction",
            "sendToServiceOwners": "[parameters('sendToServiceOwners')]"
          },
          {
            "odata.type":
"Microsoft.Azure.Management.Insights.Models.RuleWebhookAction",
            "serviceUri": "https://replacewithmonitoringsolutionwebhookurl",
            "properties": {

              "severity": "Warning",
              "subscriptionname": "[parameters('SubscriptionName')]"
            }
          }
        ]
      }
    }
  ]
}
```