QueryCloudAZ SDK 1.1

Introduction

This document provides a quick guidance on how to use QueryCloudAZ SDK send a wrapped request to NextLabs Authorization REST API and get the response within .net project.

More information about NextLabs Authorization REST API please check Policy Controller help page.

This SDK have controlled the connections to JPC and CC server, so it is safe to use it in multiple threads and the performance is ok.

Supported Platform

CC version : CC8.6 +

.Net framework: 4.0+

Important enum and class

Enum PolicyResult

Description: Query policy results. Include Deny, Allow and DontCare (no policy matched).
Deny: Denied by policy
Allow: Allowed by policy
DontCare: No policy matched

Enum CEAttributeType

Description: Attribute types.
XacmlString: XACML string
XacmlBoolean: XACML boolean
XacmlInteger: XACML integer
XacmlAnyURI: XACML URI
Others: some types that we don't care just now.

Enum QueryStatus

Description: Specify the status of query policy.
S_OK: Success
E_Failed: Error, unknown reason
E_ContentTypeNotSupported: Error, unsupported content type
E_SendFaild: Error, send request failed, maybe the PC URL is wrong or some other network issue
E_ResponseStatusAbnormal: Error, get a wrong PC response, abnormal response
E_TransformResponseFaild: Error, get a wrong PC response, cannot analysis the response
E_TransformToJsonDataFaild: Error, get a wrong PC response, cannot analysis the response to JSON type
E_MissAttributes: Error, not all necessary info has been set into the request
E_Unauthorized: Error, unauthorized from policy control
E_BadRequest: Error, some unexpected error happened in request
E_NotFound: Error, the resource cannot fond in cloud AZ
E_MethodNotAllowed: Error, request method not allow
E_ProxyAuthenticationRequired: Error, need proxy authentication
E_RequestTimeout: Error, request time out
E_RequestUriTooLong: Error, request URL is too long
E_UnsupportedMediaType: Error, unsupported media type
E_NotImplemented: Error, function is not implemented
E_BadGateway: Error, bad gateway
E_ServiceUnavailable: Error, service unavailable
E_HttpVersionNotSupported: Error, unsupported HTTP version
E_GatewayTimeout: Error, gateway timeout
E_InvalidClient: Error, invalid client

Class CEAttribute

Description: attribute information.

- CEAttribute(string strName, string strValue, CEAttributeType emAttributeType)
  Description: Attribute constructor, establish CEAttribute.
  strName: Attribute key
  strValue: Attribute value
  emAttributeType: Attribute type
- Name: Attribute key
- Value: Attribute value
- Type: Attribute type

Class CEAttres

Description: collection of CEAttribute objects.

- CEAttres ()
  Description: Attributes constructor, establish CEAttres.
- void AddAttribute(CEAttribute ceAttr)

Description: Add new CEAttribute to end of collection.
ceAttr: CEAttribute object

- CEAttribute this[int nIndex]
  Description: Get CEAttribute by index.
  nIndex: Attributes index, start from 0
  Return: Return CEAttribute object
- Count : Get CEAttribute objects count
  Description: Get CEAttribute objects count.

Class CERequest

Description: Request object.

- CERequest ()
  Description: Constructor, establish CERequest.
- void SetAction(string strAction)
  Description: Set action information.
  strAction: Action name
- void SetApp(string strName, string strPath, string strUrl, CEAttres ceAttres)
  Description: Set application information.
  strName: Application name
  strPath: Application path
  strUrl: Application URL
  ceAttres: Application attributes
- void SetUser(string strSid, string strName, CEAttres ceAttres)
  Description: Set user information.
  strSid: User SID
  strName: User name
  ceAttres: User attribute
- void SetHost(string strName, string strIPAddress, CEAttres ceAttres)
  Description: Set host information.
  strName: Host name
  strIPAddress: Host IP address
  ceAttres: Host attribute
- void SetSource(string strSourceName, string strSourceType, CEAttres ceAttres)
  Description: Set resource information.
  strSourceName: Resource name or resource URL
  strSourceType: Resource type (Policy mode short name)
  ceAttres: Resource attribute
- void SetDest(string strDestName, string strDestType, CEAttres ceAttres) Description: Set destination information.
  strDestName: Destination name or destination URL
  strDestType: Destination type (Policy mode short name)
  ceAttres: Destination attribute
- void SetEnvAttributes(CEAttres ceAttrs)
  Description: Set environment information.

ceAttres: Environment attributes

Class CEObligation

Description: Obligation object.

- CEAttres GetCEAttres()
  Description: Get obligation attributes information.
  Return: Obligation attributes information
- string GetName()
  Description: Get obligation name.
  Return: Obligation name
- string GetPolicyName()
  Description: Get matched policy name.
  Return: policy name

Class CEQuery

Description: Main object for query policy.

- CEQuery(string strPCHost, string strOAuthServiceHost, string strClientId, string strClientSecret, int nTokenExpiresTime = 10)
  Description: Constructor, establish CEQuery.
  strPCHost: Policy control host URL, like http://jpc.crm.nextlabs.solutions:58080
  strOAuthServiceHost: OAUTH server host URL, like https://cc.crm.nextlabs.solutions
  strClientId: Client ID, for example apiuser
  strClientSecret: Client secret number, for example 123456
  nTokenExpiresTime: Optional parameter, set token expires time, unit is minute
- MultipleLimited : Set limited number of CERequest list for CheckMultipleResources
  Description: Set limited number of CERequest list for CheckMultipleResources.
  (Max is "1000", default is "100")
- Authenticated: Get authenticated status
  Description: Get authenticated status.
- void RefreshToken()
  Description: Refresh token when the token is expired.
- QueryStatus CheckResource(CERequest ceRequest, out PolicyResult emPolicyResult, out List<CEObligation> listObligation)
  Description: Single Query Policy by request information and return policy result and obligations.
  ceRequest: Request contains all the information to do query policy.
  emPolicyResult : Policy result return from Policy Controller.
  listObligation: All obligations return from Policy Controller.
  Return: Query policy status
- QueryStatus CheckMultipleResources(List<CERequest> ceListRequests, out List<PolicyResult> listPolicyResults, out List<List<CEObligation>> listObligations)
  Description: Multiple query policy by requests information and return policy results and obligations.

ceListRequests: All requests to do query policy.
listPolicyResults: All policy results return from Policy Controller.
listObligations: All obligations return from Policy Controller.
Return: Query policy status

Thread Safety

- User wants to use CEQuery in thread instead of share CEQuery object to multiple threads. Performance has been optimized already.
- Any instance members are not guaranteed to be thread safe.

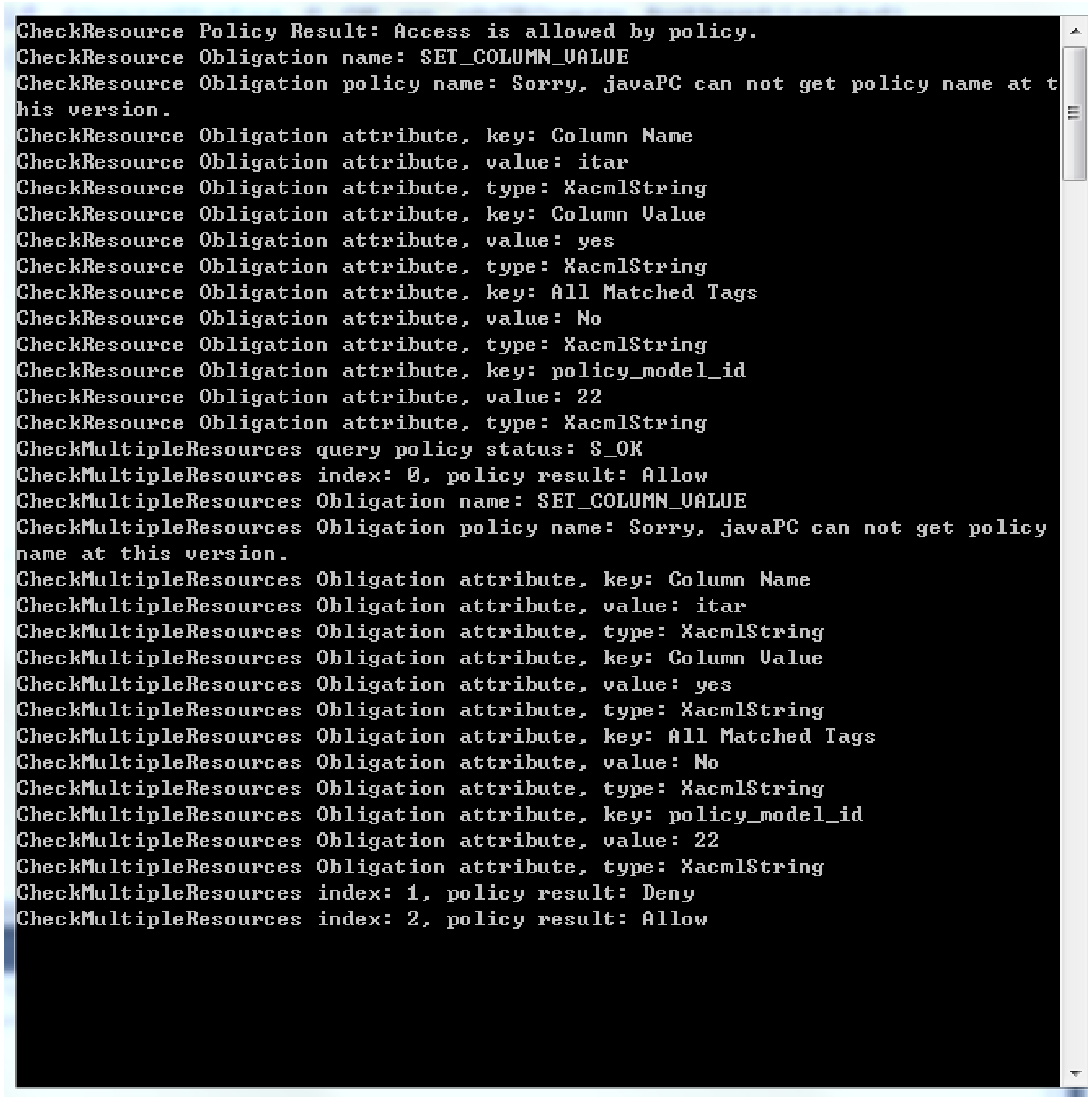
Code example

Start Visual Studio, select file->new->project “Visual C#: Console App”, create project with specified name. Replace file “Program.cs” using below file. Select “References” from project and add “QueryCloudAZSDK.dll” to it. Then build this project to test or debug.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using QueryCloudAZSDK;
using QueryCloudAZSDK.CEModel;

namespace QueryCloudAZSDKTester
{
    class Program
    {
        static CERequest CreateQueryRequest(string strAction, string strUrl)
        {
            CERequest obCERequest = new CERequest();

            // Set action info, this is mandatory
            {
                obCERequest.Set_Action(strAction);
            }

            // Set user info, this is mandatory
            {
                CEAttres obCEUserAttres = new CEAttres();
                obCEUserAttres.Add_Attre("City", "HangZhou", CEAttributeType.XACML_String);
                obCEUserAttres.Add_Attre("emailaddress", "george@test.com", CEAttributeType.XACML_String);
                obCERequest.Set_User("S-1-5-21-310440588-250036847-580389505-500", "Test@nextlabs.com",
obCEUserAttres);
            }

            // Set source info, this is mandatory
            {
                CEAttres obCESourceAttres = new CEAttres();
                obCESourceAttres.Add_Attre("age", "20", CEAttributeType.XACML_String);
                obCESourceAttres.Add_Attre("url", strUrl, CEAttributeType.XACML_String);
                // Use "spe" as resoure type (must be same with policy mode name)
                obCERequest.Set_Source(strUrl, "spe", obCESourceAttres);
            }

            // Set Destination info, this is optional
            {
                CEAttres obCEDestAttres = new CEAttres();
                obCEDestAttres.Add_Attre("toattr", "dest", CEAttributeType.XACML_String);
                obCERequest.Set_Dest("C:/Temp/Dest.txt", "spe", obCEDestAttres);
            }

            // Set application info, this is optional
            {
                obCERequest.Set_App("Sharepoint Policy Enforcement", null, null, null);
            }

            // This method can set NameAttributes (Environmental), this is optional
            {
                // You must set this if you want get policy result "Dont Care", it means there are no any policy
matched.
                obCERequest.Set_EnvAttributes("dont-care-acceptable", "yes", CEAttributeType.XACML_String);
                // You must set this if you want ignore the policy mode name.
                obCERequest.Set_EnvAttributes("use_resource_type_when_evaluating", "false",
CEAttributeType.XACML_String);
            }

            // this method can set host, this is optional
            {
                obCERequest.Set_Host("HostName", "10.23.60.12", null);
            }

            return obCERequest;
        }

        static void Main(string[] args)
        {
            try
            {
                // Establish CEQuery object
                string strJPCHost = "http://cc87-jpc.xxx.com:58080";
                string strOAuthHost = "https://cc87-console.xxx.com";
                string strClientId = "apiclient";
                string strClientSecure = "xxxxxx";
                CEQuery obCEQuery = new CEQuery(strJPCHost, strOAuthHost, strClientId, strClientSecure);
                if (QueryStatus.E_Unauthorized == obCEQuery.Authenticated)
                {
                    // If occur "E_Unauthorized"， please refresh token again.
                    obCEQuery.RefreshToken();
                }
                if (QueryStatus.S_OK == obCEQuery.Authenticated)
                {
                    List<CERequest> listRequest = new List<CERequest>();
                    List<PolicyResult> results = null;
                    PolicyResult resultSingle = PolicyResult.DontCare;
                    List<QueryCloudAZSDK.CEModel.CEObligation> obSingle = null;
                    List<List<QueryCloudAZSDK.CEModel.CEObligation>> obligations = null;
                    // Create CERequest
                    CERequest requestMy = CreateQueryRequest("OPEN", "Sharepoint://george-
sp16/myTestLib/11.docx");
                    CERequest requestYou = CreateQueryRequest("OPEN", "Sharepoint://george-
sp16/youTestLib/22.pptx");
                    CERequest requestHe = CreateQueryRequest("OPEN", "Sharepoint://daniel-
sp16/heTestLib/33.xlsx");
                    listRequest.Add(requestMy);
                    listRequest.Add(requestYou);
                    listRequest.Add(requestHe);

                    // Do Single Query Policy and get result and obligations
                    QueryStatus statueSingle = obCEQuery.CheckResource(requestMy, out resultSingle, out
obSingle);
                    if (statueSingle == QueryStatus.S_OK)
                    {
                        // resultSingle PolicyResult
                        if (resultSingle == PolicyResult.Allow)
                        {
                            Console.WriteLine("CheckResource Policy Result: Access is allowed by policy.");
                            if (obSingle != null && obSingle.Count > 0)
                            {
                                foreach (CEObligation ob in obSingle)
                                {
                                    // obligation information
                                    Console.WriteLine("CheckResource Obligation name: " + ob.Get_Name());
                                    Console.WriteLine("CheckResource Obligation policy name: " + ob.Get_PolicyName());
                                    CEAttres obAttrs = ob.GetCEAttres();
                                    int count = obAttrs.get_count();
                                    for (int i = 0; i < count; i++)
                                    {
                                        string key = "";
                                        string value = "";
                                        CEAttributeType emAttrType = CEAttributeType.XACML_String;
                                        obAttrs.Get_Attre(i, out key, out value, out emAttrType);
                                        Console.WriteLine("CheckResource Obligation attribute, key: " + key);
                                        Console.WriteLine("CheckResource Obligation attribute, value: " + value);
                                        Console.WriteLine("CheckResource Obligation attribute, type: " + emAttrType);
                                    }
                                }
                            }
                        }
                        else if (resultSingle == PolicyResult.Deny)
                        {
                            Console.WriteLine("CheckResource Policy Result: Access is denied by policy.");
                        }
                        else
                        {
                            Console.WriteLine("CheckResource Policy Result: Don't match any policy.");
                        }
                    }
                    QueryStatus statueMultiple = obCEQuery.CheckMultipleResources(listRequest, out results, out
obligations);
                    Console.WriteLine("CheckMultipleResources query policy status: " + statueMultiple.ToString());
                    if (statueMultiple == QueryStatus.S_OK)
                    {
                        for (int i = 0; i < results.Count; i++)
                        {
                            Console.WriteLine("CheckMultipleResources index: " + i + ", policy result: " +
results[i].ToString());
                            if (results[i] == PolicyResult.Allow)
                            {
                                if (obligations != null && obligations.Count > i && obligations[i] != null &&
obligations[i].Count > 0)
                                {
                                    // obligation information
                                    foreach (CEObligation ob in obligations[i])
                                    {
                                        Console.WriteLine("CheckMultipleResources Obligation name: " + ob.Get_Name());
                                        Console.WriteLine("CheckMultipleResources Obligation policy name: " +
ob.Get_PolicyName());
                                        CEAttres obAttrs = ob.GetCEAttres();
                                        int count = obAttrs.get_count();
                                        for (int j = 0; j < count; j++)
                                        {
                                            string key = "";
                                            string value = "";
                                            CEAttributeType emAttrType = CEAttributeType.XACML_String;
                                            obAttrs.Get_Attre(j, out key, out value, out emAttrType);
                                            Console.WriteLine("CheckMultipleResources Obligation attribute, key: " + key);
                                            Console.WriteLine("CheckMultipleResources Obligation attribute, value: " + value);
                                            Console.WriteLine("CheckMultipleResources Obligation attribute, type: " +
emAttrType);
                                        }
                                    }
                                }
                            }
                        }
                    }
                }
                else
                {
                    Console.WriteLine(string.Format("Establish CEQuery object failed: [{0}]\n",
obCEQuery.Authenticated));
                }
            }
            catch(Exception exp)
            {
            Console.WriteLine("Main Exception: " + exp);
          }
          Console.ReadLine();
       }
    }
}
```

Test case to get query policy result and obligation using above file:

```
            ID 303 STATUS APPROVED POLICY "ROOT_303/geo-setcolumn"
               ATTRIBUTE TRUE_ALLOW
               TAG spe="spe"
               FOR TRUE
               ON OPEN
               BY TRUE
               WHERE (TRUE AND (TRUE AND resource.spe.url = "sharepoint://geo**11.docx"))
               DO allow
               ON allow DO SETCOLUMN_VALUE("Column Name", "itar", "Column Value", "yes", "All
Matched Tags", "No", "policy_model_id", "22")
               ON deny DO log
            ID 304 STATUS APPROVED POLICY "ROOT_304/geo-deny"
               FOR TRUE
               ON OPEN
               BY TRUE
               WHERE (TRUE AND (TRUE AND resource.spe.url = "sharepoint://geo**22.pptx"))
               DO deny
               BY DEFAULT DO allow
               ON deny DO log
```

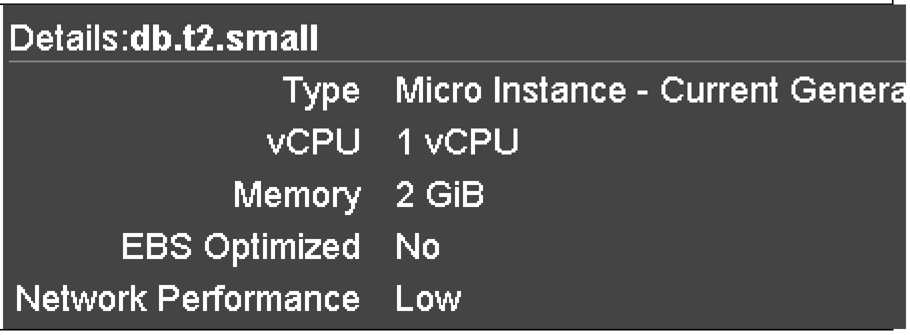


```
CheckResource Policy Result: Access is allowed by policy.
CheckResource Obligation name: SET_COLUMN_VALUE
CheckResource Obligation policy name: Sorry, javaPC can not get policy name at t
his version.
CheckResource Obligation attribute, key: Column Name
CheckResource Obligation attribute, value: itar
CheckResource Obligation attribute, type: XacmlString
CheckResource Obligation attribute, key: Column Value
CheckResource Obligation attribute, value: yes
CheckResource Obligation attribute, type: XacmlString
CheckResource Obligation attribute, key: All Matched Tags
CheckResource Obligation attribute, value: No
CheckResource Obligation attribute, type: XacmlString
CheckResource Obligation attribute, key: policy_model_id
CheckResource Obligation attribute, value: 22
CheckResource Obligation attribute, type: XacmlString
CheckMultipleResources query policy status: S_OK
CheckMultipleResources index: 0, policy result: Allow
CheckMultipleResources Obligation name: SET_COLUMN_VALUE
CheckMultipleResources Obligation policy name: Sorry, javaPC can not get policy
name at this version.
CheckMultipleResources Obligation attribute, key: Column Name
CheckMultipleResources Obligation attribute, value: itar
CheckMultipleResources Obligation attribute, type: XacmlString
CheckMultipleResources Obligation attribute, key: Column Value
CheckMultipleResources Obligation attribute, value: yes
CheckMultipleResources Obligation attribute, type: XacmlString
CheckMultipleResources Obligation attribute, key: All Matched Tags
CheckMultipleResources Obligation attribute, value: No
CheckMultipleResources Obligation attribute, type: XacmlString
CheckMultipleResources Obligation attribute, key: policy_model_id
CheckMultipleResources Obligation attribute, value: 22
CheckMultipleResources Obligation attribute, type: XacmlString
CheckMultipleResources index: 1, policy result: Deny
CheckMultipleResources index: 2, policy result: Allow
```

Performance

Cloud AZ Environmental:

Region	North Virginia	For Latency parameter
Control Center	Instance Type	t2.medium
	RAM	4.0 GiB
	Number of CPU	2 vCPU
	Volume Type	EBS (general Purpose SSD)
	Volume Size	50 GB
	Network	Low to Moderate
	Auto scaling	Architecture doesn't support scaling – so only 1 instance
ICE-NET	Instance Type	T2.small
	RAM	2.0 GiB
	Number of CPU	1 vCPU
	Volume Type	EBS
	Volume Size	50 GB
	Network	Low to Moderate
	Scalability	Behind Auto scaling Group
	Scaling Activity	NO – Min and Maximum Set to 1 instances (meaning it remains 1 regardless of load)
JPC	Instance Type	T2.small
	RAM	2.0 GiB
	Number of CPU	1 vCPU
	Volume Type	EBS
	Volume Size	50 GB

	Network	Low to Moderate
	Scalability	Behind Auto scaling Group
	Scaling Activity	NO – Min and Maximum Set to 2 instances (meaning it remains 2 regardless of load)
RDS	Database Engine	PostgreSQL 9.5.4
	IOPS	NOT Supported for this instance type
	Instance Type	db.t2.small
		

Details:db.t2.small

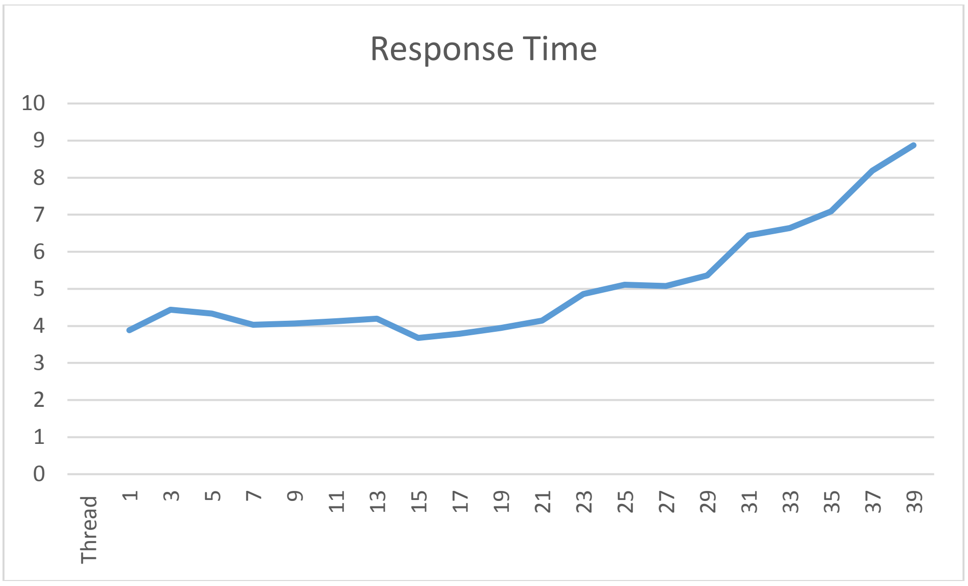
Type	Micro Instance - Current Genera
vCPU	1 vCPU
Memory	2 GiB
EBS Optimized	No
Network Performance	Low

Windows Instance: Inter(R) Xeon(R) CPU E5-2676 V3 @2.40GHZ 2.40GHZ, 8GB RAM

Windows Instance	Instance Type	t2.large
	RAM	8.0 GiB
	Number of CPU	2 vCPU
	Volume Type	EBS (general Purpose SSD)
	Volume Size	40 GB
	Network	Low to Moderate
	OS	Windows server 2012

.NET SDK Performance Test Result

Thread	Response Time
1	3.884962956
3	4.43567502
5	4.331834059
7	4.033296117
9	4.066425742
11	4.123820555
13	4.192879178
15	3.676241211
17	3.784292021
19	3.945818388
21	4.141557993
23	4.857606752
25	5.108772838
27	5.077417177
29	5.357934096
31	6.439139446
33	6.638609735
35	7.08728129
37	8.184151118
39	8.872921698


Response Time
10
9
8
7
6
5
4
3
2
1
0
Thread
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39