



# AvaTax REST V2 SDK for IBM i

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## Implementation Guide

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## Introduction

Avalara provides automated sales tax solutions to streamline cumbersome, error-prone tax compliance processes and reduce the risk of loss or penalty in case of an audit. Our solutions automatically perform address validation, jurisdiction research, and rate calculation and allow you to manage even the most complicated tax issues, such as nexus, tax tiers, tax holidays, exemptions, certificate management, and product taxability rules.

AvaTax Calc is a powerful, online sales tax compliance solution. The AvaTax REST V2 SDK for IBM i (SDK) allows you to easily create an integration with AvaTax Calc. It is designed to operate with most AS400, iSeries or IBMi applications where tax calculation or address validation is required.

The SDK makes the AvaTax Calc and Address Validation web services available to customers and developer partners alike, providing full testing and support services as well as optional time-saving connector examples.

## The Business Case

Accurately calculating sales and use tax reports for the myriad of jurisdictions where companies conduct business is complicated, time consuming, and confusing. Large corporations with hefty specialized tax or accounting departments use expensive, complex software systems to compute rates and file required reports. But medium-sized and smaller businesses can rarely afford the investment such "enterprise" systems require. End users are forced to manually find, collect, and update information, and if they do it incorrectly, may be exposed to serious consequences of non-compliance.

Avalara is committed to freeing companies from their manual and error-prone processes today with the costs associated with adding new clients, time consuming tax rate research, and tax schedule maintenance. The AvaTax solution delivers best practices in sales and use tax compliance, provides companies with improved internal controls, and is designed to integrate into existing order management systems providing the best end-user experience. Avalara provides you with a rich tax API in the SDK to achieve the best possible end-user experience. The SDK is fully documented, including sample code and complete certification requirements.

## Document Scope

This document is restricted to describing implementation of the SDK product and the requirements of the IBMi environment needed for the SDK to consume Avalara web services.

## Who Should Read this Document

Any developer with an interest connecting to Avalara web services using the SDK should read this document. They will create the 'Blue' ERP-specific connector shown in Figure 1.1 below. The 'Green' AvaTax SDK for IBM i provided by Avalara handles building the REST request, sending it to the service, and parsing the returned JSON response.



Figure 1.1

## Features and Benefits of the AvaTax SDK for IBM i

The SDK:

- Is written entirely in RPG. There is no need for developers to use or understand Java. Furthermore, there is no need to implement IBM Websphere.
- Uses the latest Avalara REST v2 API interface
- Runs on all versions of the IBMi operating system from V6R1
- Has a small footprint. It requires the installation of a single library of about 150MB.
- Handles all Internet communications with Avalara web services.
- Is supported by Avalara.

## What Does the AvaTax SDK for IBM i Do?

A typical use would be as follows:

1. An application passes an invoice to the SDK for which a tax calculation is required.
2. The SDK adapter receives the invoice details and generates a REST enabled request which it transmits over the Internet to the Avalara tax calculation web service.
3. The SDK then receives the response message from the service, parses it, and returns the calculated tax results back to the calling application. Details of the transaction can be recorded in the customer's cloud-based AvaTax Admin Console for reconciliation and/or tax filing purposes.

## Prerequisites

Several prerequisites must be in place before using the AvaTax SDK for IBM i.

## Requirements and Constraints

Following are requirements and constraints associated with the SDK. Check that these are satisfied before beginning installation.

### Software and Hardware Requirements

- A IBMi (AS/400, iSeries, or i5) running OS/400 version V6R1 or later.
- TCP/IP installed and configured. To check TCP/IP installation, type GO LICPGM at a command line and look for the entry highlighted in Figure 2.0.

For example, 5761TC1 IBM TCP/IP Connectivity Utilities for i5/OS

For more information, see:

<http://pic.dhe.ibm.com/infocenter/iseries/v6r1m0/index.jsp?topic=/rzaij/rzaijlantcp.htm>

```
Display Installed Licensed Programs                                System:  TAX1

Licensed  Installed
Program   Status      Description
5761LSV   *COMPATIBLE  Extended Integrated Server Support
5761NAE   *COMPATIBLE  Network Authentication Enablement
5761PT1   *COMPATIBLE  IBM Performance Tools for i5/OS
5761PT1   *COMPATIBLE  Performance Tools - Manager Feature
5761PT1   *COMPATIBLE  Performance Tools - Agent Feature
5761PT1   *COMPATIBLE  Performance Tools - Job Watcher
5761QU1   *COMPATIBLE  IBM Query for i5/OS
5733SC1   *INSTALLED   IBM Portable Utilities for i5/OS
5733SC1   *INSTALLED   OpenSSH, OpenSSL, zlib
5761ST1   *COMPATIBLE  DB2 Query Mgr and SQL DevKit
5761TC1   *COMPATIBLE  IBM TCP/IP Connectivity Utilities for i5/OS
5761TS1   *COMPATIBLE  IBM Transform Services for i5/OS
5761TS1   *COMPATIBLE  Transforms - AFP to PDF Transform
5770UME   *COMPATIBLE  5770UME 00

More...

Press Enter to continue.

F3=Exit  F11=Display release  F12=Cancel  F19=Display trademarks
```

Figure 2.0

## Digital Certificates

You must ensure that all users will have access to the key database which is part of the certificate store and is stored in the IFS.

For information on using Digital Certificate Manager to set up your store see Appendix E.

If you are using the \*SYSTEM certificate store, which is the normal case, then the database can be found in the /QIBM/USERDATA/ICSS/CERT/SERVER directory of the IFS. If you're using a different certificate store, then it will be located wherever you decided to put it.

In either case you will need to make sure any AvaTax users have access to the key databases. The easiest way to do this is to grant \*PUBLIC access to the directories and key databases. Users will need read (\*R) access to the key database and at least read/execute (\*RX) authority to each of the nested directories that it is in.

Use the WRKLNK command to access each object link and then use option 9 to work with authorities.

e.g. WRKLNK '/'

```
Work with Object Links

Directory . . . . :

Type options, press Enter.
 2=Edit  3=Copy  4=Remove  5=Display  7=Rename  8=Display attributes
11=Change current directory ...

Opt  Object link      Type      Attribute  Text
 9   /                DIR

Parameters or command
==>

F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

Bottom
```

Then option '2' to change the authority.

```

Work with Authority

Object . . . . . : /
Type . . . . . : DIR
Owner . . . . . : QSYS
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

--Object Authorities--
Opt  User      Data      Authority  Exist  Mgt  Alter  Ref
--  --
_   *PUBLIC    *RWX      X      X      X      X
_   QSYS      *RWX      X      X      X      X
_   QDIRSRV    *X

```

Bottom

```

Parameters or command
===>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 2009.

```

Continue down the chain until QIBM, USERDATA, ICSS, CERT and SERVER all have authority that looks like Fig.2.1a below. User \*PUBLIC \*RX.

```

Work with Object Links

Directory . . . . . : /qibm

Type options, press Enter.
  2=Edit  3=Copy  4=Remove  5=Display  7=Rename  8=Display attributes
  11=Change current directory ...

Opt  Object link      Type      Attribute  Text
_   UserData          DIR

```

Bottom

```

Parameters or command
===>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve  F12=Cancel  F17=Position to
F22=Display entire field  F23=More options

```



```

Work with Authority

Object . . . . . : /qibm/UserData
Type . . . . . : DIR
Owner . . . . . : QSYS
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data          --Object Authorities--
      Authority  Exist  Mgt  Alter  Ref
--
-   *PUBLIC      *RX
-   QSYS         *RWX          X    X    X    X
-   QDIRSRV      *X
-   QTIVOLI      *RX

Bottom

Parameters or command
==>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 2007.

```

```

Work with Authority

Object . . . . . : /qibm/UserData/ICSS/Cert/Server
Type . . . . . : DIR
Owner . . . . . : QSYS
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user  2=Change user authority  4=Remove user

Opt  User          Data          --Object Authorities--
      Authority  Exist  Mgt  Alter  Ref
--
-   *PUBLIC      *RX
-   QSYS         *RWX          X    X    X    X

Bottom

Parameters or command
==>
F3=Exit  F4=Prompt  F5=Refresh  F9=Retrieve
F11=Display detail data authorities  F12=Cancel  F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 2007.

```

Fig. 2.1a

The two 'DEFAULT' files in the Server directory will need to have the public authority shown in Fig. 2.1b  
 \*PUBLIC \*R

```

Work with Authority

Object . . . . . : /qibm/UserData/ICSS/Cert/Server/DEFAULT. >
Type . . . . . : STMF
Owner . . . . . : QSYS
Primary group . . . . . : *NONE
Authorization list . . . . . : *NONE

Type options, press Enter.
  1=Add user   2=Change user authority   4=Remove user

--Object Authorities--
Opt  User      Data Authority Exist Mgt Alter Ref
--  ---
  *PUBLIC  *R
  QSYS     *RW      X      X      X      X

Bottom

Parameters or command
==>
F3=Exit   F4=Prompt   F5=Refresh   F9=Retrieve
F11=Display detail data authorities   F12=Cancel   F24=More keys
(C) COPYRIGHT IBM CORP. 1980, 2007.

```

Fig.2.1b

Alternatively, you can use the following commands to make the necessary changes.

CHGAUT OBJ('/') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM/UserData') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM/UserData/ICSS') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM/UserData/ICSS/CERT') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM/UserData/ICSS/CERT/SERVER') USER(\*PUBLIC) DTAAUT(\*RX)

CHGAUT OBJ('/QIBM/UserData/ICSS/CERT/SERVER/DEFAULT.KDB') USER(\*PUBLIC) DTAAUT(\*R)

CHGAUT OBJ('/QIBM/UserData/ICSS/CERT/SERVER/DEFAULT.RDB') USER(\*PUBLIC) DTAAUT(\*R)

## SDK Limits

The limits for a single tax call are as follows:

- 3750 detail lines
- 500 addresses

## AvaTax Admin Console

Tax profiles as well as other company organizational settings are managed within the AvaTax Admin Console (a secure website). Tax reporting is also a function of the AvaTax Admin Console. **You will need to have an AvaTax Admin Console account to use Avalara web services.** Credentials and instructions are provided to you as part of your order fulfillment or you can sign up for a free trial account by going to <http://developer.avalara.com>

## Training

It is a recommended best practice that individuals using the AvaTax Admin Console - as well as the developers of SDK custom connectors - attend a free Avalara University webinar. Webinars cover the AvaTax Admin Console functions as well as most major ERPs.

Classes are held regularly and appear for sign up at the Avalara Help Center (<https://help.avalara.com>). Please select the class that is appropriate for your company's subscription (Pro or Basic) and the ERP used.

Developers, although not necessarily maintaining company settings in the AvaTax Admin Console, are highly encouraged to take these same webinars to gain a thorough understanding of the AvaTax Admin Console and how it relates to the results and actions of the SDK custom connectors.

## AvaTax Admin Console and Web Service

### To Login to the AvaTax Admin Console

1. Enter the **URL** to the **Development** AvaTax Admin Console: <https://admin-development.avalara.net/>

#### **NOTE**

- The **Production** AvaTax Admin Console URL is <https://admin-avatax.avalara.net/>

2. Enter your **User Name** (for example, [avalara.sample@avalara.com](mailto:avalara.sample@avalara.com))
3. Enter the **Password** that was sent to you via email

#### **NOTES**

- This password is temporary. You are prompted to enter a new password.
- If you have lost this password, click the [Forgot your Password?](#) link on the login screen.

**You are on the Sandbox Environment**

**Avalara AvaTax**

### Log in

\* User Name:

\* Password:

[Forgot password?](#)

[Log in](#)

**New Users:** Retrieve your user name and password from your email account or contact your organization's administrator for further instructions.

**Exemption certificates: Are you at risk?**

Make audits less painful and less expensive with Avalara CertCapture

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AvaTax Version 15

**Avalara**  
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**LOGIN LINKS**  
[Avalara CertCapture](#)

Figure 2.1

## Installing the AvaTax SDK for IBM i

This section explains how to install SDK to your system, setup your system control file, and test the service connection.

### Install the AVATAX Library onto your IBM Server

Components for SDK are contained in a single library, by default called AVATAXR2. The first step is to install the AVATAXR2 library onto your system. To make this task simple Avalara provides an installer. Running the installer will download the latest version of the SDK onto your IBMi and install it.

If this is the first time that you are doing this then a new SDK library will be created.

If you want to upgrade your existing version of the SDK the installer works the same way as for a new install. However, all your custom settings are retained in the upgraded version.

**Here are the instructions for installing or upgrading the SDK.**

1.0) Sign off the IBMi

2.0) Sign on as QSECOFR or a profile with \*ALLOBJ authority

3.0) Download the Avatax Installer. At a command line key the following;

3.1) CRTSAVF FILE(QTEMP/AVASTALLER)

3.2) Start an FTP session by typing **ftp 'ftp.taxrates.com'** at a command line. Follow the script below.

Connecting to host FTP.TAXRATES.COM at address 10.52.0.15 using port 21.

220 Microsoft FTP Service

**> ftp\_avatax**

331 Password required for ftp\_avatax.

**> Avalara!**

230 User ftp\_avatax logged in.

Windows\_NT

**> bin**

200 Type set to I.

**> lcd qtemp**

Local working directory is QTEMP

**> cd ftp600\_avatax**

250 CWD command successful.

**> get avastaller (replace**

500 'EPSV': command not understood

227 Entering Passive Mode (10,52,0,15,19,24).

125 Data connection already open; Transfer starting.

226 Transfer complete.

236544 bytes transferred in 0.043 seconds. Transfer rate 5505.024 KB/sec.

**>quit**

3.3) Restore the saved objects to QTEMP using the command below.

```
RSTOBJ OBJ(*ALL) SAVLIB(QTEMP) DEV(*SAVF) SAVF(QTEMP/AVASTALLER)
RSTLIB(QTEMP)
```

4.0) Run the installer by typing BUILDR2. The installer will now create or update your SDK library. If you are performing an update rather than a new install, then all your custom configurations will be retained.

The installer works in 2 parts. The first part downloads the latest version of the SDK to a library called ORANGE (Note: You must have FTP enabled on your IBMi). The second part is a submitted job called RV2BUILD that updates or creates your SDK library.

At the end of the upgrade or install check the job log of the RV2BUILD job to make sure that the update was successful.

```
Character values (INCLRRM parameter): -- Field values (INCLREL parameter):
*NONE Command 07/28/17 13:00:53.987245 QCADRV QSYS 03BA RV2006C ORANGE 015A
Message . . . : 17100 - DLCOBJ OBJ((AVATAXR2 *LIB *EXCLRD))
*NONE Command 07/28/17 13:00:53.987330 QCADRV QSYS 03BA RV2006C ORANGE 0163
Message . . . : 17200 - SNDPGMMSG MSG('AVATAXR2 SDK Library upgraded
successfully')
*NONE Information 07/28/17 13:00:53.987371 RV2006C ORANGE 0163 QCMD QSYS 01C8
Message . . . : AVATAXR2 SDK Library upgraded successfully
*NONE Command 07/28/17 13:00:53.987410 QCLRTNE QSYS 0058 RV2006C ORANGE 020C
Message . . . : - RETURN /* RETURN due to end of CL program
*/
CPC2191 Completion 00 07/28/17 13:00:54.006205 QLIDLFIL QSYS 006F QLICLLIB QSYS 05DC
Message . . . : Object RV20BJ in QTEMP type *FILE deleted.
CPF1164 Completion 00 07/28/17 13:00:54.006314 QWTMCE0J QSYS 014A *EXT *N
Message . . . : Job 531326/GWILSON/RV2BUILD ended on 07/28/17 at 13:00:54;
More...

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys
```

If you do not see the success message you or you receive an error message check your job log for errors. Correct the issue and try again or contact [support@avalara.com](mailto:support@avalara.com) for assistance.

The installer is designed to either update your library successfully or leave it alone. However, in the unlikely event that you should experience problems with your SDK library after an install a pre-update copy of your objects is saved in a library called AVABACK.

5.0) Sign off and on again to use your application.

6.0) If you have built a connector that uses the SDK then don't forget to recompile your connector program over the new SDK library.

## Authorizing Users to the AvaTax SDK for IBM i Menu System

The AvaTax SDK for IBM i has its own menu system which allows easy access to the maintenance and inquiry functions. The first time you try access the menu and add new users you will need to sign on with the QSECOFR user profile.

Menu Security gives control over which users have access to the SDK menu items.

Setting up menu security *must* be performed to use the SDK application.

### Files:

- SC0005P – Table of User Profiles/Authorized Menu Options
- SC0010P – Menu Options

### Program:

- SC0005R – User Authority Maintenance

### Command:

- RV2 – start the menu system



To start the menu security program:

1. Add AVATAXR2 to your library list (ADDLIB AVATAXR2 \*FIRST).
2. Type 'RV2' at the command line and press <Enter>.
3. This brings up the AvaTax SDK for IBM i menu shown in Figure 3.1 below.

```
MAIN                               AvaTax SDK for IBM i                               3/15/16
GWILSON                           Main Menu                               13:31:35

1. Maintenance Menu                13. INFOR XA Setup Options
2. Inquiry Menu

                                     20. Integration Tester Defaults
                                     21. Integration Tester

11. Administration Menu           23. Work with Spool Files
                                     24. Signoff

Enter Option: __

F3=Exit
Copyright 2013 Avalara, Inc. All Rights Reserved
```

Figure 3.1

4. Select option 11 – Administration Menu
5. At the next screen take option 2 – Menu security. The screen shown in Figure 3.2 below is displayed. From here you can change, copy, delete, display, and add users.

## NOTE

- Remember to press F5 to update!

```
SC0005-A          AvaTax SDK for IBM i          4/16/13
GWILSON           User Authority Maintenance     12:08:03

Type Option, Press Enter.
2=Change   3=Copy   4=Delete   5=Display
Opt  User      User Text
-    GWILSON    Graham Wilson user profile
-    QSECOFR    Security Officer
-    RONB       Ron Brown

Bottom

F3=Exit      F6=Add
Copyright 2013 Avalara, Inc. All Rights Reserved

MA  a                               MW                                09/003
```

Figure 3.2

## Configuring the System Control File

All information needed to connect and authenticate to the Avalara web services on the development server is provided with the SDK and contained in the system control file (RV2001P). You just need to add your company and the Account and Password provided by Avalara. When you decide to go live with your application you need to make sure you create a system control file entry that has your production company and credentials with Account Type = 'P'.

```
RV2001R                               Edit System Control File Record                               5/15/17
                                                                                               12:50:07
Company: 1                               Active: Y

Operation: create
          (create, adjust, commit, void , resolve, transactions)
Authorization String (BASE64 encoded):
R3JhaGGfh#56&8n4MTEwIQ==

Account Type: S (S-andbox or P-roduction)

Request Filename: /tmp/create_in.txt (Opt)
Result Filename: /tmp/create_out.txt (Opt)

Compact JSON Y/N: N      Avatax Request Time Out (secs): 10

Debug Y/N: Y Debug Filename: /tmp/*AUTO
                              (e.g /tmp/mydebug.txt)

F3=Exit F12=Cancel
```

Figure 2.2

- **Company**

Set this to the same value as you used for company in your admin console.

- **Active**

Used to switch the service on or off.

- **Operation**

This is the operation that you wish to perform. For example, the create operation allows you to calculate taxes and optionally record the result in your admin console.

See <https://sandbox-rest.avatax.com/swagger/ui/index.html#/> or <https://developer.avalara.com/> for more details regarding operations and what they do.

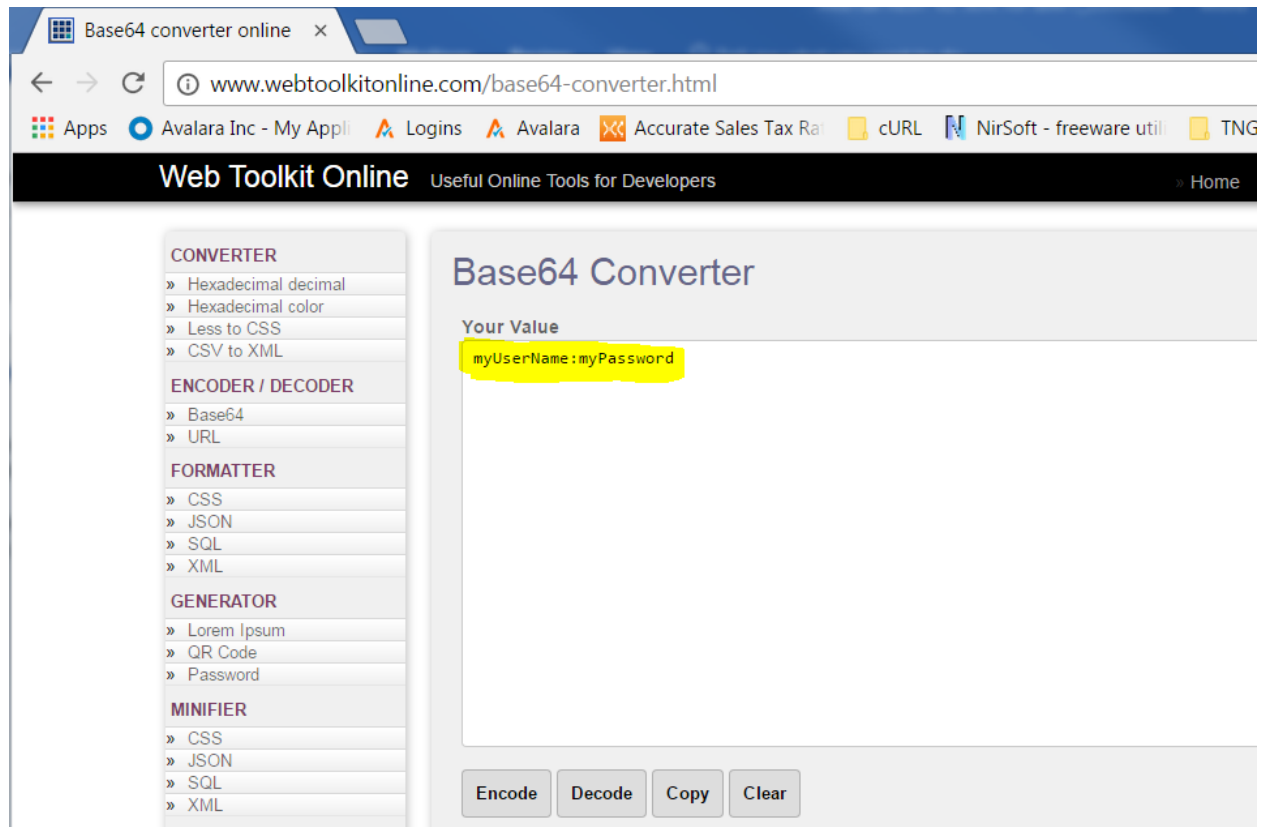
- **Authorization String**

This should be entered as a BASE64 encoded string version of your Avalara ID and password.

You can obtain the BASE64 encoded string by using an online encoder like the one at ...

<http://www.webtoolkitonline.com/base64-converter.html>

Enter your Avalara provided user Id and password separated by a colon and then hit the encode button. Your credentials will be converted into an encoded string that can be cut and pasted into your system control file record.



- **Account Type**

Select 'S' to use a development (sandbox) account.

Select 'P' to use a production account.

- **Request Filename**  
You can optionally enter an IFS location and file that will be used to build and stream your outgoing web service message. If you leave it blank the request will be handled in main memory which will give slightly faster performance. However, if you need access to the outgoing JSON data stream then you can use the file approach.
- **Result Filename**  
You can optionally enter an IFS location and file that will be used to receive your incoming result stream. If you leave it blank the request will be handled using a default file.
- **Compact JSON**  
Enter Y to compact the outgoing JSON request for more efficient performance.
- **Avatax Request Time Out**  
You can adjust the time (in seconds) that the SDK adapter waits for a response. If you experiencing HTTPS time out issues then increase this value.
- **Debug Y/N**  
Entering Y in this field will put the SDK into debug mode and a comprehensive report will be produced for all transactions.
- **Debug Filename**  
You can optionally enter the IFS directory and filename that you would like to record the debug data to. Leaving it blank will result in an output file called httpapi\_debug.txt.

**Note:** Debug files are overwritten by subsequent transactions. This can be frustrating in a busy environment where you are trying to get results for a specific document. To overcome this, use \*Auto for the filename. This will force the SDK to generate a new filename for each call in the format avatax\_debugnnn.txt where nnn is a unique number between 001 – 999. When the number hits 999 the files will start to recycle from 001 again.

e.g. /tmp/\*Auto will create a unique file in the IFS tmp directory.

## Testing the Connection to Avalara Web Services

Now that you have set up the system control details, you are ready to test your connection to the service.

### To Test the Connection to Avalara Web Services

1. From the Maintain System Control File main screen put a 'T' next to the service you want to test and press <Enter>.

```
RV2001R          Maintain Avalara System Control File          5/19/17
                                                           12:55:43

Type option, press Enter.
 2=Edit 3=Copy 4=Delete 5=Display T=Test Credentials

Opt Company Code      Operation      Environment      Active
--  ---
_  1                adjust          Sandbox          Y
_  1                commit          Sandbox          Y
I  1                create          Sandbox          Y
_  1                resolve          Sandbox          Y
_  1                transactions     Sandbox          Y
_  1                void            Sandbox          Y
_  2                adjust          Sandbox          Y
_  2                commit          Sandbox          Y
_  2                create          Production       Y

F1=Info  F3=Exit  F6=Add
Copyright 2004-2016 Avalara, Inc. All Rights Reserved
```

2. If you have correctly configured the service you will get a 'Success' response as shown in Figure 3.7.

```
RV2001R          Maintain Avalara System Control File          5/19/17
                                                           12:55:43

Type .....
2=E :              Test Connection Settings Result              :
:                                                                :
Opt : Result: Congratulations you have connected to Avatax      :
-   :                                                                :
-   :                                                                :
I   : Detail: Version: 17.5.1-73                                :
-   :       Authenticated: true                                  :
-   :       Auth Type: UsernamePassword                          :
-   :       User Name: Graham                                    :
-   :       User Id: 13706                                       :
-   :       User Acct: 1100057680                                :
-   :                                                                :
:       Exit=<Enter>                                             :
:                                                                :
: .....

F1=Info  F3=Exit  F6=Add
Copyright 2004-2016 Avalara, Inc. All Rights Reserved
```

Figure 3.7





## SDK Integration Tester

Once your connection to the service has tested OK, you can use the SDK Integration Tester to generate transactions on your AvaTax Admin Console account for the purposes of testing, learning more about how the system works, or working out a business scenario that you may wish to implement.

The tester is available as from the first screen of the AvaTax SDK for IBM i menu. It looks like the example in Figure 3.9 and allows you to create many of the transaction scenarios allowed by the AvaTax web service.

```
RV2003R                      REST V2 Integration Tester                      5/19/17
Dft: 01 Company: 1                      Operation: create
Ship TO:                               Ship FROM:
Line1: 100 Ravine Lane
Line2:
City: Bainbridge Island                Seattle
State: WA Zip: 98110 Country: US      WA 98101 US
Lat/Lng: .000000 .000000              .000000 .000000

DocDate: 2017-05-19 DocCode: EntUse: _ Record: N Commit: N
CustNo: Cus100 PO#: 123456 Exempt Code:
O/ride=> Amt: .00 Typ: Date: 2017-03-28 Rsn:
Adjust=> Rsn: Desc:

# Item Code/Desc Inc Ent Tax Code Qty Amount Rate% Tax Total
1 Lumber 2 x 6 N _ 1 100.00 9.000 9.00 109.00
  2 x 6 pressure treated
2 CAT PS2-10 N _ 2 80.00 9.000 7.20 87.20
  7/16 CAT PS2-10 OSB Sheathing
3 Freight N _ FR020100 1 75.00 9.000 6.75 81.75
  Freight charge

-----
                                22.95 277.95

F1=Help F3=Exit F4=Refresh
```

Figure 3.9

## Integration Tester Defaults

For your convenience, we have provided an option to allow you to save your favorite test scenarios. This can save you the need for repetitive typing when testing.

```
RV2004R                               Maintain Test Defaults - Select                               5/19/17
                                                                                               16:08:50

Type option, press Enter.
 2=Edit  3=Copy  4=Delete

Opt  Key  Description
_    FL   Create - No record
_    LL   Use Lat/Long
_    S1   NY Example - Using Address
_    01   Create - No record
_    02   Void a Transaction
_    03   Commit a Transaction
_    04   Adjust a Transaction
_    05   Retrieve a Transaction

F1=Help  F3=Exit  F6=Add
```

Select, edit, copy, delete, or add default templates.

RV2004R	REST V2 Integration Tester Defaults	5/19/17						
Dft: 01	Create - No record	16:10:07						
Co: 1	Transaction Type: create							
Ship TO:		Ship FROM:						
Line1: 100 Ravine Lane								
Line2:								
City: Bainbridge Island	Seattle							
State: WA Zip: 98110 Country: US	WA 98101 US							
Lat/Lng: .000000 .000000	.000000 .000000							
DocDate: 0001-01-01	DocCode:	EntUse: _ Record: N Commit: N						
CustNo: Cus100	PO#: 123456	Exempt Code:						
O/ride=> Amt: .00	Type:	Date: 2017-03-28 Rsn:						
Adjust=> Rsn:	Desc:							
#	Item Code	Description	Inc	Ent	Tax	Code	Qty	Amount
1	Piano	Bechstein concert piano	N	-			1	5000.00
2	Violin	Stradivarius demo model	N	-			2	800.00
3	Oboe	Ordinary oboe	N	-			1	550.00
F1=Help F3=Exit F6=Add								

Populate as required and save with a unique Dft: value (for example, 01 above).

To use the template, type the Dft: code into the first field of the Integration Tester (Figure 3.9) and press <Enter>. The screen is populated with the appropriate data.

## Canadian Taxes

Some users will have the need to print a summary of the Canadian taxes on their invoices or documentation. The Avatax API returns this data in detail form per order line but does not provide a summary for the entire document. To make summarizing Canadian taxes easier Avalara provides a program called RV2009R which can be used to return a summary of Canadian taxes for a given invoice. This program is included in your AVATAXR2 library. A demo program showing how to use RV2009R is included as menu option 2 on the INQUIRY menu. The source is in AVATAXR2/QRPGLESRC RV2009RT.

```
5761WDS V7R1M0 100416          SEU SOURCE LISTING          11/03/17 10:41:12  TAX1          PAGE 1
SOURCE FILE . . . . . RV2DEV/QRPGLESRC
MEMBER . . . . . RV2CANTAX
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8 ...+... 9 ...+... 0
100      // Include this copy member
200      /copy RV209CP                      CA Tax Parameters
300
400      /free
500      // Clear TAX Buffer
600      clear TAX;
700      // Set the Company and Document (Order/Invoice #) Codes
800      TAX.Company = Company;
900      TAX.DocCode = DocCode;
1000     // Get the Canadian Tax Breakdown
1100     GetCanTax(TAX);
1200     // Check the error code is *Blank and extract the results
1300     if TAX.ErrCode = *Blanks;
1400         // TAX.GstTaxName contains the GST Tax Name e.g. CANADA GST/TPS
1500         // TAX.GstRate contains the GST Tax % Rate e.g. 5.00
1600         // TAX.GstTax contains the GST Tax Amount e.g. 30.00
1700         // TAX.PstTaxName contains the PST Tax Name e.g. ONTARIO HST
1800         // TAX.PstRate contains the PST Tax % Rate e.g. 8.00
1900         // TAX.PstTax contains the PST Tax Amount e.g. 48.00
2000     else;
2100         // Handle error condition
2200         // TAX.ErrCode contains 'Error'
2300         // TAX.ErrText contains the error message
2400     endif;
2500 /end-free
                                     * * * * E N D O F S O U R C E * * * *
```

**Note:** RV2009R uses the Avalara **transactions** operation, so make sure that you activate that function with your company code and valid credentials in your System Control file.

## Developing Your Connector

This section gives guidance and examples of how to use the SDK to connect to Avalara web services. If you remember from Figure 1.1, the SDK handles the building of the SOAP request, performs the HTTP transmission, and parses the returned XML returning the results to your program in an easily manageable data structure.

The more complex parts of planning your integration with the SDK will be determining:

- When to call the AvaTax web service.
- When to update your ERP's internal tables with the results data that are returned from the AvaTax web service.
- When to save the results to the AvaTax database in preparation for tax reporting.
- How to handle returns, delayed shipments, credits, and discounts.

## Web Service Operations

The following is an explanation of the data structures used by the SDK.

### SysCtl - HTTP Parameters Used by the Web Service Call

These parameters are easy to populate. Simply chain to the System Control file using a key of Company Code and Operation type (e.g. `ctl_cmpy = '1'` `ctl_oper='create'`) and then populate the SysCtl data structure with the returned results.

Refer to Appendix A for a table of SysCtl parameters, lengths, and types.

### TaxHdr – Document Header Details

This structure is used to pass the order or invoice header details and also to receive document level taxation details like the Total Tax or Total Amount for a document.

Refer to Appendix A for a table of parameters, lengths, and types.

### TaxLin – Document Line Details

This structure is used to pass the order or invoice line details.

Refer to Appendix A for a table of parameters, lengths, and types.

### TaxDet – Tax Line Details Returned by AvaTax

This structure returns tax jurisdiction details per order or invoice line. There can be up to 10 separate tax jurisdictions per line (for example, State, County, City, Special, etc.).

## TaxAdr – Addresses used for Calculation Returned by AvaTax

This structure returns the actual addresses and boundary level information used by Avatax when calculating taxes.

Refer to Appendix A for a table of parameters, lengths, and types.

## TaxSum – Summary of Taxes Returned by AvaTax

This structure returns a summary of the of the taxes calculated by Avatax and separated by actual taxing jurisdiction. So, for example, if you were delivering to an address in Los Angeles, CA then this data structure would contain the document level summary totals for each individual taxing jurisdiction, as shown in the example below.

Tax Name		Rate	Amount
CA STATE TAX	CALIFORNIA	6.000	60.000
CA COUNTY TAX	LOS ANGELES	.250	2.500
CA SPECIAL TAX	LOS ANGELES COUNTY	1.500	15.000
CA SPECIAL TAX	LOS ANGELES CO LOCAL	1.000	10.000

Refer to Appendix A for a table of parameters, lengths, and types.

## TaxMsg – Returns Error Messages

This structure returns error messages sent by the service.

Refer to Appendix A for a table of parameters, lengths, and types.

## Coding Considerations

In your AVATAXR2 library you will find a source member called QRPGLSRC/RV2EXAMPLE. This is not a working program but it will take you through all the steps required to complete your AVATAX connector using the SDK. Just follow the steps 1 through 9.

```
Columns . . . : 6 100 Browse AVATAXR2/QRPGLSRC
SEU==> RV2EXAMPLE
FMT ** ... 1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7 ... 8 ... 9 ... 0
***** Beginning of data *****
0001.00 // ***** 150827
0002.00 // * STEP 1 - include the following H-Specs 150827
0003.00 // ***** 150827
0004.00 // 150827
0005.00 H DFTACTGRP(*NO) BNDDIR('HTTAPI') 150803
0006.00 H BNDDIR('YAJL') DECEDIT('0.') 150803
0007.00 H OPTION(*SrcStmt:*NoDebugIO) 150803
0008.00 // 150827
0009.00 // ***** 150827
0010.00 // * STEP 2 - include filespec for the System Control file 150827
0011.00 // ***** 150827
0012.00 // 150827
0013.00 F* RV2 - System Control File 170414
0014.00 FRV2001P if e k disk 170414
0015.00 // 150827
0016.00 // ***** 150827
0017.00 // * STEP 3 - include the following copy members and 170414
0018.00 // * define the System Control key list 170414
0019.00 // ***** 150827

F3=Exit F5=Refresh F9=Retrieve F10=Cursor F11=Toggle F12=Cancel
F16=Repeat find F24=More keys
(C) COPYRIGHT IBM CORP. 1981, 2007.
```

Also look at the source for some of the other demo programs like the Integration Tester (RV2003R) to see how they were used to return a tax calculation.

## Easy Operations – Canada Tax, Void Tax, Commit Tax, Refund Tax and Retrieve Document

For your convenience, the SDK includes some pre-programmed functions that make it easy to retrieve the **GST/PST breakdown** of a Canadian invoice, **Void** a tax transaction, **Commit** a previously uncommitted transaction, **Refund** a transaction or **Retrieve** the details of a previously calculated document. This section describes how to use them.

### Retrieve Canadian Tax Breakdown

This function will retrieve the GST/PST breakdown for a Canadian. Useful if you need to print those details on an invoice. The source code showing how to call this function can be found in AVATAXR2/QRPGLESRC RV2CANTAX.

```
SOURCE FILE . . . . . AVATAXR2/QRPGLESRC
MEMBER . . . . . RV2CANTAX
SEQNBR*..... 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 ..... 0
100      // Include this copy member
200      /copy RV209CP                               CA Tax Parameters
300
400      /free
500      // Clear TAX Buffer
600      clear TAX;
700
800      // Set the Company and Document (Order/Invoice #) Codes
900      TAX.Company = myCompany;
1000     TAX.DocCode = myDocCode;
1100
1200     // Get the Canadian Tax Breakdown
1300     GetCanTax(TAX);
1400
1500     // Check the error code is *Blank and extract the results
1600     if TAX.ErrCode = *Blanks;
1700     // TAX.GstTaxName contains the GST Tax Name e.g. CANADA GST/TPS
1800     // TAX.GstRate contains the GST Tax % Rate e.g. 5.00
1900     // TAX.GstTax contains the GST Tax Amount e.g. 30.00
2000     // TAX.PstTaxName contains the PST Tax Name e.g. ONTARIO HST
2100     // TAX.PstRate contains the PST Tax % Rate e.g. 8.00
2200     // TAX.PstTax contains the PST Tax Amount e.g. 48.00
2300     else;
2400     // Handle error condition
2500     // TAX.ErrCode contains 'Error'
2600     // TAX.ErrText contains the error message
2700     endif;
2800     /end-free
                                     * * * * * E N D   O F   S O U R C E   * * * * *
```

### Void Tax

This function allows you to Void an existing document by passing your company code, document code and document type. The source code showing how to call this function can be found in AVATAXR2/QRPGLESRC RV2VOID.

```
SOURCE FILE . . . . . RV2DEV/QRPGLESRC
MEMBER . . . . . RV2VOID
SEQNBR*..... 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 ..... 0
100      // Include this copy member
200      /copy RV211CP                               Void Tax Parameters
300
400      // Clear TAX Buffer
500      clear VTAX;
600
700      // Set the details of the document to be voided
800      VTAX.Company = myCompany; // e.g. '1'
900      VTAX.DocCode = myDocCode; // e.g. '0123456'
1000     VTAX.DocType = myDocType; // e.g. 'SalesInvoice'
1100
1200     // Void the document
1300     VoidTax(VTAX);
1400
1500     // Check the Result
1600     if VTAX.RtnCode <> 'Success';
1700     // Handle error condition
1800     // VTAX.RtnCode contains 'Error'
1900     // VTAX.RtnText contains the error message
2000     endif;
2100     /end-free
                                     * * * * * E N D   O F   S O U R C E   * * * * *
```



## Commit Tax

This function allows you to Commit an existing document by passing your company code and document code. The source code showing how to call this function can be found in AVATAXR2/QRPGLESRC RV2COMMIT.

```
SOURCE FILE . . . . . AVATAXR2/QRPGLESRC
MEMBER . . . . . RV2COMMIT
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8 ...+... 9 ...+... 0
100      /copy RV212CP                                Commit Tax Parameters
200
300      /free
400          // Clear TAX Buffer
500          clear CTAX;
600
700          // Get the invoice to Commit from the screen input
800          CTAX.Company = Company;
900          CTAX.DocCode = DocCode;
1000
1100         // Commit the document
1200         CommitTax(CTAX);
1300
1400         if CTAX.RtnCode <> 'Success';
1500             // Handle error condition
1600             // VTAX.RtnCode contains 'Error'
1700             // VTAX.RtnText contains the error message
1800         endif;
1900
2000         result = CTAX.RtnCode;
2100         errsum = CTAX.RtnText;
2200     /end-free
                                     * * * * E N D O F S O U R C E * * * *
```

## Refund Tax

This function allows you to quickly and easily create a `ReturnInvoice` representing a full refund for a previously created `SalesInvoice` transaction.

The program `RV2014RT` is a working example of this function and is available from the SDK Inquiry menu. The source member `AVATAXR2/QRPGLESRC RV2REFUND` contains the code needed to use this function which you can copy into your own program.

```
400      /copy RV214CP                                Refund Tax Parameters
500
600      /free
700      // Clear TAX Buffer
800      clear RTAX;
900
1000     // Set the details of the document to be refunded
1100     RTAX.Company = myCompany;      // e.g. '1'
1200
1300     RTAX.DocCode = myDocCode;      // The document code to refund
1400
1500     RTAX.NewDocCode = myNewDocCode; // The credit memo document # to
1600                                     // be created. If left blank then
1700                                     // myDocCode + '_CR' will be used.
1800
1900     RTAX.DocType = DocType;         // The document type being credited
2000                                     // e.g. SalesInvoice.
2100
2200     RTAX.Date = Date;               // The date applied to to the credit
2300
2400     RTAX.Reason = Reason;           // The reason for the credit
2500
2600     // Refund the document
2700     RefundTax(RTAX);
2800
2900     // Check the Result
3000     if RTAX.RtnCode <> 'Success';
3100         // Handle error condition
3200         // RTAX.RtnCode contains 'Error'
3300         // RTAX.RtnText contains the error message
3400     endif;
3500
3600     *inlr = *on;
3700 /end-free

      * * * * E N D   O F   S O U R C E * * * *
```

## Retrieve Document Details

This function retrieves the details of a previously calculated document. The source code showing how to call this function can be found in AVATAXR2/QRPGLESRC RV2RTV. The results are returned in the same data structure and format as used by 'create'. If the call was successful, then SysCtl.errorCode will contain 'Success' and SysCtl.errorText will contain a successful completion message (e.g. 0123456 retrieved OK.) If there was a problem, then SysCtl.errorCode will contain the error code returned by the service and SysCtl.errorText will contain the error description (e.g. Document not found).

The program RV2013RT is a working example of this function. It can be called as follows:

CALL PGM(RV2013RT) PARM('myCompany' 'myDocumentCode')

```
100      H OPTION(*SECLVL:*SRCSTMT:*NODEBUGIO)
200      H DFTACTGRP(*NO) BNDDIR('HTTAPI':'QC2LE')
300
400      // Include the Retrieve Tax Prototype
500      /copy RV213CP
600
700      /free
800
900      // Clear the tax buffers
1000     clear TaxHdr;
1100     clear TaxLin;
1200     clear TaxDet;
1300     clear TaxAdr;
1400     clear TaxSum;
1500     clear TaxMsg;
1600
1700     // Set the Company Code and the Document Code to retrieve
1800     TaxHdr.companyCode = myCompany; // e.g. '1'
1900     TaxHdr.code = myDocCode;       // e.g. '0123456'
2000
2100     // Retrieve the document
2200     RetrieveTax(SysCtl:
2300               TaxHdr:
2400               TaxLin:
2500               TaxDet:
2600               TaxAdr:
2700               TaxSum:
2800               TaxMsg);
2900     /end-free
                                     * * * * * E N D   O F   S O U R C E * * * * *
```

## Handling Return Invoices

Return Invoice processing is largely a business practice that the developer and the business manager need to map out prior to coding or moving forward to a production environment. As the business needs of every company is as unique as their products, it should not be expected that the scenarios described below will work for your specific situation, or that we have any “one size fits all” solution that you can “snap in” to your development; rather it is up to the developer to fashion a solution that fits the company’s business model.

### Committed Document – Refund (Return Invoice)

For the example provided below, we will process a return invoice on the following invoice.

Document No	Customer / Vendor Code	Batch Code	Document Type	Document Date	Cur	Total	Non-Taxable	Taxable	Tax	Location Code	Document Status	Status Date
70000	AvaCustomer		Sales Invoice	7/19/2010	USD	3375.00	0.00	3375.00	163.71		Committed	8/19/2010

The invoice has the following line items:

No	Item	Tax Code	Use Code	Sourcing	Line Amount	Discount	Non-Taxable	Taxable	Tax
1	NBCP-000-S	PC030100		D	100.00	0.00	0.00	100.00	4.85
2	NBCP-000-L	PC030100		D	125.00	0.00	0.00	125.00	6.08
3	NBCP-000-2XL	PC030100		D	500.00	0.00	0.00	500.00	24.25
4	NBCP-000-3XL	PC030100		D	800.00	0.00	0.00	800.00	38.80
5	NBBP-000-L	PC030100		D	1800.00	0.00	0.00	1800.00	87.30
6	Shipping	FR020200		D	50.00	0.00	0.00	50.00	2.43

### Assumptions:

- The document in question has already been **committed** and tax remitted to the tax jurisdictions.
- There may be multiple lines in the document.
- A **complete** or **partial** refund is the expected outcome

### Steps:

1. Call a ‘create’ with a duplicate of the document (invoice) you want to process returns on:
  - a. using the same invoice number, or
  - b. with a new invoice number (DocCode) with the original invoice number passed in the reference number field, or
  - c. re-use the original document’s invoice number with a “.1” added to it

### NOTE

- *You can only use ReturnInvoice method once using the original DocCode. A DocStatusError results if you attempt to commit a second document using ReturnInvoice with a duplicate DocCode*

Document No	Customer / Vendor Code	Batch Code	Document Type	Document Date	Cur	Total	Non-Taxable	Taxable	Tax Location Code	Document Status	Status Date
70000	AvaCustomer		Sales Invoice	7/19/2010	USD	3375.00	0.00	3375.00	163.71	Committed	8/19/2010
70000.1	AvaCustomer		Return Invoice	8/19/2010	USD	-600.00	0.00	-600.00	-29.10	Committed	8/19/2010

- Set the DocType to ReturnInvoice (very important if you are re-using the original DocCode).
- Set the DocDate to the tax reporting month that you want the return to appear in (typically the current month).
- Set the TaxOverride property to TaxDate.
- Set the TaxOverrideDate to the date the original invoice computed tax. AvaTax calculates the tax based on this date.
- Set the AdjustmentReason to Return Items (or whatever makes sense for your business needs).
- Optional: Set the GetTaxRequest **ReferenceCode** = to the original Invoice for tracking purposes.

#### NOTE

- Pass only line items being returned. Do not include the line items that will not be returned unless all items are returned. In the example below we are returning line items 1 and 3.

- Set the Amt field to a negative dollar amount.

#### NOTE

- Always leave Qty as a positive.

No	Item	Tax Code	Use Code	Sourcing	Line Amount	Discount	Non-Taxable	Taxable	Tax
1	NBCP-000-S	PC030100		D	-100.00	0.00	0.00	-100.00	-4.85
3	NBCP-000-2XL	PC030100		D	-500.00	0.00	0.00	-500.00	-24.25

Once sent to the AvaTax web service, the tax engine will return negative tax amounts on the line items based on the TaxDate specified. If no TaxDate is set, the document date will be used to calculate tax.

#### NOTE

*The Taxable Amounts on a Return Invoice show negative amounts equal to the items returned.*

#### Summary:

Out of the six items originally processed, two items have been reversed on your tax reporting – in this case \$29.10 appears essentially as a “credit” on the current month’s tax liability.

#### Handling Shipping and Freight

Shipping (Freight) should be sent as a separate line item on a document. Avalara has a number of pre-defined freight codes to cover various business scenarios but a good default code to use is FR020100. This tax code will automatically charge or not charge tax on Freight, according to the regulations of the state referenced in the Ship To address.

## Handling Discounts

The recommended best practice for handling discounts is in the following manner:

- It is expected that the create operation should pass a dollar amount of the discount at the Document level.
- It is also expected that anywhere from one to many line items have the Discounted property set to 'true'.
- For each line item to which the discount applies AvaTax allocates the discount across those line items and reduces the tax base by the amount of the allocation.
- On the AvaTax Admin Console, the line items show the discounted amounts that applied (see Figure 4.1).
- For line items that you want discounted, ensure you pass the net amount (versus the discounted amount) to the Adapter.

### NOTE

- *Manufacturing Discounts should not be passed to AvaTax.*

Some Examples:

1. **Basic:** A \$25.00 line item is sold with a \$10.00 discount. The resulting tax base is \$15.00.  
**Simple:** Two \$25.00 line items are sold with a \$10.00 discount, with only one item marked for the discount. The resulting tax base is \$15.00 for the item marked for Discount and \$25.00 for the item not marked for discount.
2. **Typical:** Two \$25.00 line items are sold with a \$10.00 discount, with both line items marked for the discount. The resulting tax base is \$20.00 for each item marked for discount.
3. **Complex:** Three line items and a Freight line item are sold (one for \$25, \$35, and \$45) with a **\$20.00** discount, with all items (except Freight) marked for the discount. The resulting tax calculation would appear this way on the Admin Console.

Origin:  
100 RAVINE LN NE, BAINBRIDGE ISLAND, WA, 98110-2687, US

Document ID:  
Document Code:  
Customer/Vendor Code:  
Document Status:  
Document Date:  
Payment Date  
Document Type:  
Location Code:  
Tax Date:  
Purchase Order No:  
Reference Code:

17530654  
102111-1  
AvaTim  
Uncommitted on 10/21/2011  
10/21/2011  
1/1/1900  
Sales Invoice  
  
10/21/2011

Destination:  
100 RAVINE LN NE, BAINBRIDGE ISLAND, WA, 98110-2687, US

Salesperson Code:  
Entity Use Code:  
Total Amount:  
Total Discount:  
Total Non-Taxable:  
Total Taxable:  
Tax Override Type:  
Tax Override Reason:  
Total Tax:  
Adjustment Reason:  
Adjustment Description:

120.00  
20.00  
0.00  
100.00  
None  
  
8.60  
Not Adjusted

Expand All

Currency in USD

No	Item	Tax Code	Use Code	Sourcing	Line Amount	Discount	Non-Taxable	Taxable	Tax	TO	JO	Tax Included
1	AvaProduct 1	P0000000		D	25.00	4.76	0.00	20.24	1.75			
2	AvaProduct 2	P0000000		D	35.00	6.67	0.00	28.33	2.43			
3	AvaProduct 3	P0000000		D	45.00	8.57	0.00	36.43	3.12			
4	FREIGHT	FR020200		D	15.00	0.00	0.00	15.00	1.30			

Ready

Figure 4.1

### NOTE

- *The discount was apportioned across the three items but not the Freight.*

- *The taxable amount was reduced by a total of the discount applied (\$20).*

## Messages – Results / Error

Understanding and taking appropriate action on error messages is **critical** to the successful implementation of a custom SDK connector. The errors and warnings that result from web service calls guide the receiver to the most logical problem resolution path.

For example; if an API, such as 'create' fails, the receiver should always iterate through the messages collection that is part of the result set and check the contents of the Name, Summary, Details, and Refers To fields of each message. Often the contents of these messages will indicate what the problem is.

All connectors should check the errorCode on the return from the web service call and contain code that will program for:

- errorCode = SeverityLevel.**Success**
- errorCode = SeverityLevel.**Error**
- errorCode = SeverityLevel.**Exception**

### NOTES

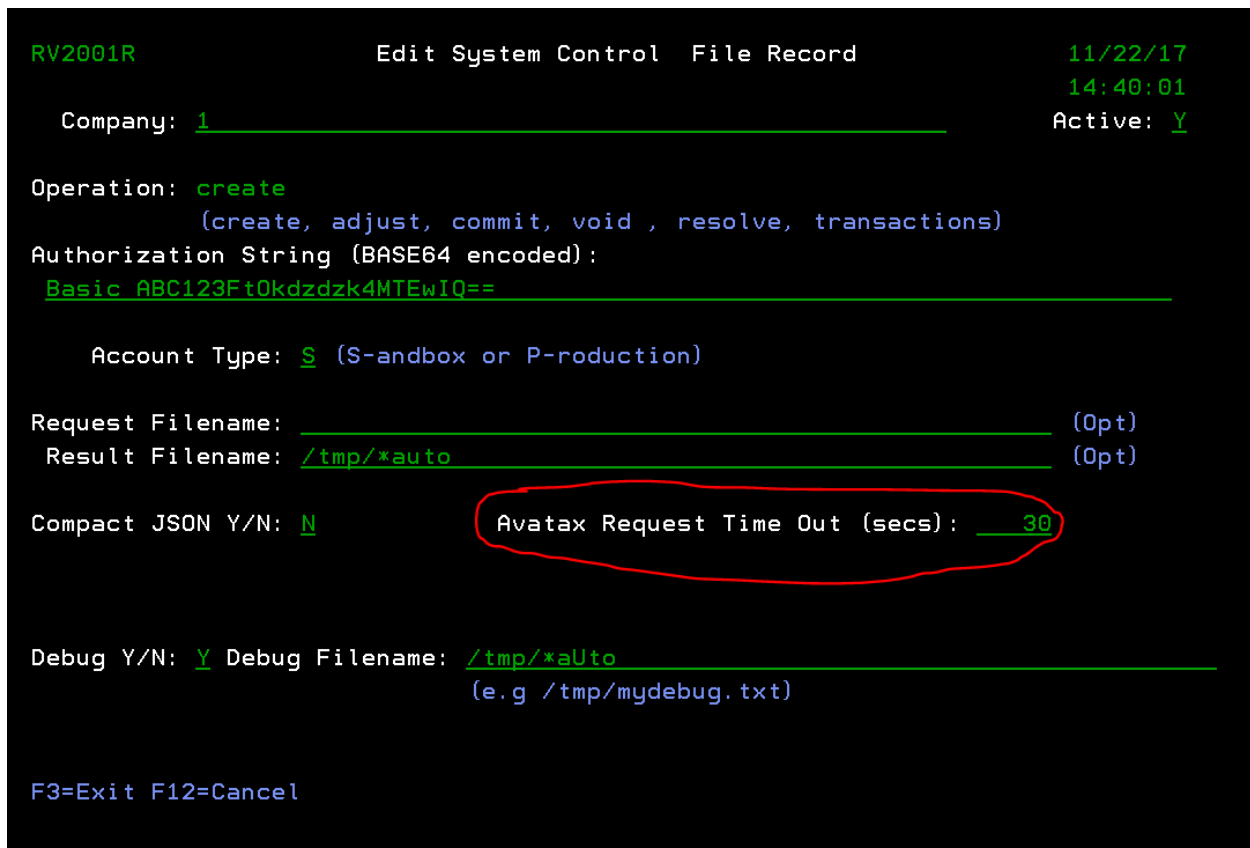
- *Typically, **Exception** is only returned by a system error from the Avalara web service and will be caused by circumstances outside of the client application's control (that is not having an Internet connection will return the error).*
- *In general, the path taken for errorCode= **Exception** should be the same as for errorCode=**Error**.*

## Time Outs

Although HTTP communications are generally very fast and reliable, occasionally you may experience a time out error. This error happens when the SDK adapter is waiting for a response but does not receive one within the specified time out interval, so it gives up waiting. This could be due to several different factors. For example, maybe someone is rebooting a router or firewall, disconnecting from the internet temporarily for maintenance or maybe your ISP has an issue.

Here are some things you can do to reduce the risk of time outs.

- 1) In the System Control file you can configure the time out interval in seconds. If you are experiencing time outs, try increasing the wait time.



RV2001R Edit System Control File Record 11/22/17  
14:40:01  
Company: 1 Active: Y  
Operation: create  
(create, adjust, commit, void, resolve, transactions)  
Authorization String (BASE64 encoded):  
Basic ABC123Ft0kdzdzk4MTEwIQ==  
Account Type: S (S-andbox or P-roduction)  
Request Filename: (Opt)  
Result Filename: /tmp/\*auto (Opt)  
Compact JSON Y/N: N Avatax Request Time Out (secs): 30  
Debug Y/N: Y Debug Filename: /tmp/\*aUto  
(e.g /tmp/mydebug.txt)  
F3=Exit F12=Cancel

- 2) Make sure that you are on the latest release of the SDK. The SDK adapter from release 1.7 onwards has some built in resilience. It traps time out errors and resubmits the request up to 5 times. If after 5 attempts a successful response is not received, then it returns an error to the caller with SysCtl.errorCode = 'Error' and SysCtl.errorText = 'CommSSL\_Read: Timeout'.

From release v1.8 the time out resilience was improved to deal with the situation where a transaction was successfully recorded and committed in Avatax but due to a time out error the details were not returned to the caller. In this case, subsequent attempts to commit the transaction results in a **'DocStatus is invalid for this operation.'** error. The SDK is now able to automatically detect this situation and will attempt to retrieve the missing details and return them to the caller who will see it as a normal, successful



transaction. After 5 attempts, if the adapter continues to receive time out errors it will return an error to the caller with SysCtl.errorCode = 'Error' and SysCtl.errorText = 'CommSSL\_Read: Timeout'.

From v1.8 a feature has been included that allows a developer to force a time out situation. This is useful for testing time out error handling functions. It is recommended that developers use this feature with a 'SalesOrder' transaction type as 'SalesInvoice' transactions are subject to the time out resilience feature described above and may not return a 'CommSSL\_Read: Timeout' error. To enable the Force Timeout feature set the data area AVATAX2/RV2008DA = 1.

**Note:** Do not forget to set the data area back to 0 once testing is complete.

Turn Force Timeout ON ....

CHGDTAARA DTAARA(AVATAXR2/RV2008DA) VALUE(0)

Turn Force Timeout OFF ....

CHGDTAARA DTAARA(AVATAXR2/RV2008DA) VALUE(0)

## Address Validation - 'create' Method

While a fully validated street address is always better, taxing jurisdictions can usually be unambiguously determined if at a minimum city, state, and ZIP Code are provided (and at least two-thirds are valid).

However, even though it is possible for the **'create'** request to be called devoid of a valid street address or even ZIP Code, the results may omit Special taxes (that is transit, stadium, levy, etc.) that are specific to the jurisdictional boundaries the shipped to address may be liable for. Without a valid street address it may be next to impossible to return tax results that should be included if the address was less ambiguous.

A **'create'** call attempts to normalize an address. If the address cannot be normalized, it continues with processing a Sales Order/Invoice with what it has. Albeit rare, incomplete or erroneous addresses submitted via **'create'** operations will return incorrect results.

## Understanding Boundary levels

Boundary levels, returned by Avatax, indicate the jurisdiction boundary precision level enumerations (below) found for the address submitted. From highest (1) to lowest (3):

1. Address: Street address precision
2. Zip9: 9-digit zip precision
3. Zip5: 5-digit zip precision

The result depends on the accuracy of the address as well as the precision level of the state provided jurisdiction boundaries.

### **NOTE**

- *In some jurisdictions, the highest level of precision to return an accurate tax result may well be level two or three. However, this is the exception versus the rule.*

## Useful Links

### Web Service URLs

These are the development and production web service URLs.

#### Development

<https://sandbox-rest.avatax.com>

#### Production

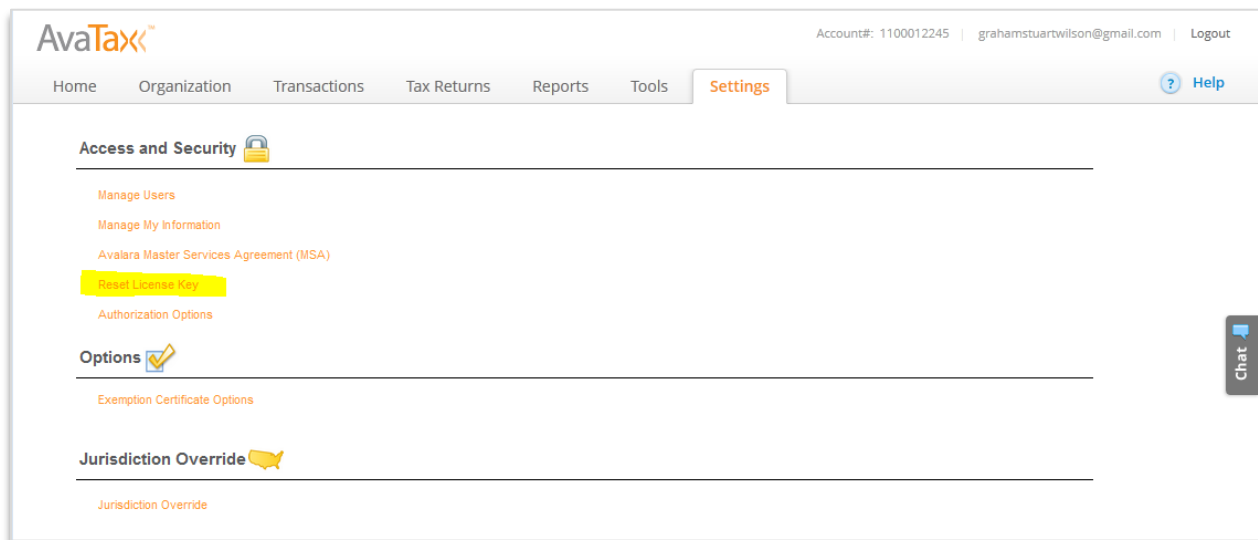
<https://rest.avatax.com>

### developer.avalara.com

You will find useful links and information here to get you building your SDK connector. Use the free trial to get an Admin Account (pre-set up) that you can use while developing your SDK connector. Trial accounts are valid for one month.

### Resetting Your License Key

If you've lost or forgotten your license key you can reset it. Sign in to the AvaTax Admin Console. Select the Settings tab and then click Reset License Key.



### NOTE

- Resetting the license key has the effect of invalidating the old key, and breaks all connector connection to the AvaTax web service still using that old license key (including AvaTax ERP Connectors using the same account number). In other words, when you reset your license key, you will need to change the credential properties in the AvaTax SDK for IBM i System Control file for all services using the same account number.

## Tax Compliance

AvaTax tax calculations are “data-driven”, meaning data that affects a tax calculation may include:

- State and Local Nexus Admin Console settings
- Taxability rules based upon Customer type codes and Item tax codes
- Exemption Certificates
- Other tax rules defined

## Nexus Jurisdictions

Nexus Jurisdictions (formerly Nexus) is a term meaning the sufficient connection a business has with a taxing jurisdiction. This connection obligates the business to calculate, collect, report, and remit tax. The connection is established by business activity being conducted in the taxing jurisdiction.

Typically, a business in the United States must have a “substantial physical presence” in a taxing jurisdiction to be required to register there. The following may constitute a “substantial physical presence” in a taxing jurisdiction, and therefore an obligation to calculate, collect, report, and remit tax:

- A corporate office, storefront, or remote sales office
- Remote employees working from home on business payroll
- Owned or rented warehouse space containing owned inventory
- Owned inventory leased to a customer
- Sales or marketing representatives making regularly scheduled visits
- Delivery of product by a business owned vehicle

Rules governing what constitutes “substantial physical presence” vary from jurisdiction to jurisdiction. Determining exactly how a rule applies to your business is critical.

Businesses in the European Union may not have a “substantial physical presence” in an EU country. Instead, businesses can select other EU countries where they:

- Have reached or exceeded the buying or selling threshold of that EU country, or
- Have voluntarily decided to register in that EU country to reclaim VAT charges

### NOTE

- *Contact Avalara Professional Services, an accountant, a tax attorney, or other qualified tax professional to conduct a Nexus Jurisdictions analysis for your US-based business. For US-based businesses, AvaTax Calc assumes:*
  - Transactions in Nexus Jurisdictions are fully taxable
  - Transactions in non-Nexus Jurisdictions are non-taxable and receive a 0.00% tax calculation

For EU-based businesses, the EU country in which the transaction takes place is only one consideration that AvaTax Calc uses. Other factors affecting AvaTax Calc are the type of good sold, whether that good is taxable or exempt, and whether it is sold to a business or a consumer.

More granular control over taxing Transactions is provided by

- Tax Codes
- Tax Rules
- Items

If you have more questions, please refer to your Admin Console setup or check out the AvaTax Admin Console Training.

## Item Code versus Tax Code

Item Code versus Tax Code in line Items:

- Special product taxability rules can be defined using Item and/or Tax Codes:
  - Line Item Code or Tax Code
- Item Codes represent individual products, whereas Tax Codes represent categories of products. For example:
  - Item Codes of M for Milk, E for Eggs, and C for Cheese.
    - Then a TaxCode of GR might be established for the broader category of Groceries.

Product Taxability Rules are defined in the AvaTax Admin Console in terms of Tax Codes.

**For example:** Groceries are not taxable in the state of Washington so a taxability rule might be established that states 'when a line item is passed with the Tax Code GR, and the destination address is Washington, the line item is charged \$0 tax'.

The mechanism to get the tax rule defined above by one of two methods:

1. In the AvaTax Admin Console, map Item Codes to a Tax Code(s) then send the Item Code for your individual product SKU.
  - a. Using the example above, Item Codes M, E, and C would be mapped to each via TaxCode GR. Then if Line.Item Code = M, E or C they would automatically map to Tax Code GR, and the rule for Tax Code GR will apply.
2. Send the Tax Code GR in Line Tax Code field.
  - a. Method #1 is popular, because it allows you to send your own internal SKUs without setting up any additional tables. This is especially true for PRO or SST customers because Avalara is typically supplying the Tax Code(s) for them.

If you send a value in **both** the Item Code and the Tax Code fields, the behavior is as follows:

1. If the **Item Code** sent maps to a **Tax Code**, the mapped Tax Code will be used for product taxability rules, regardless of what is sent in the Tax Code field.
2. If the **Item Code** sent does not map to a **Tax Code**, the Tax Code sent will be used for product taxability rules.
3. Lines that have, or are mapped to **Tax Codes** that have no rule associated with them are simply taxed at the applicable rates for Origin, Destination and Nexus Jurisdiction settings.

## Pre - GoLive Check List

Once you have things up and running, here is a recommended checklist you should go through in order to validate that your connector is working correctly.

### Documents

- Evidence of committed documents in the AvaTax Admin Console.
- Evidence that a Freight/Shipping line was tested within a saved document.
- Evidence of a voided document (use of **void**).
- Evidence that returns, partial returns, delayed shipping, and if appropriate drop shipping methods were tested successfully.
- Evidence that Return Invoices are passing negative amounts versus negative quantities.

### Item Codes and Description

- Verification that there are Item Codes with corresponding Item Descriptions (a requirement for SST and AvaTax Returns customers).
- Verification that tax rules, tax codes, and / or Item Codes mapped to tax codes are tested in transactions and are functioning as expected. Those that appear out of character will be flagged and the developer notified via the analysis process.
- Verify that all Items Codes are not set to the default tax codes. For example; item codes mapped to Tangible Personal Property or P0000000.
- Verify that the use of the FR tax code (Freight) is not defaulting to the Tangible Personal Property (P0000000) tax code which may have the effect of incorrect tax results.

### Nexus Jurisdictions

- Verify the company's local nexus selected (the tax jurisdiction they are doing business in).
- Verify that the Nexus Jurisdiction settings appear to support the expressed or written business needs of the customer.
- Evidence that you have tested transactions that fall inside and outside of Nexus Jurisdictions.

### Server Audit

- Evidence of the use of DocType="SalesOrder" is present and results in a saved document (DocType="SalesInvoice").
- An analysis that results in an "appropriate" ratio of Validate and SalesOrder to SalesInvoice transactions. Best practice recommendation is ratio to be 2-6-1 (that is 2 address validations and 6 SalesOrder transactions to complete 1 committed document [reportable]).
- An analysis that results in an "appropriate" number of errors (that is address validation errors, or tax service errors encountered in a normal business flow).

Verification that future production ready company codes are not flagged as Test companies. Test companies will be reported as part of the analysis results.



## How to Go Live

Eventually you will want to point your transactions to the Avalara production server and start calculating and recording real data.

To do this you need to set up an entry in the System Control file that points to the production rather than the development server.

You will need to change the Company, Authorization String and Account Type settings. Company and Authorization String must be your production credentials supplied to you by Avalara. Also, change The account type to be 'P' which will point your transactions to the Production URL.

```
RV2001R                      Edit System Control  File Record                      6/05/17
                                                                15:13:16
Company: 2                      Active: Y

Operation: create
          (create, adjust, commit, void , resolve, transactions)
Authorization String (BASE64 encoded):
R3JhaGFtDfr44FRfMTEwIQ==

Account Type: P (S-andbox or P-roduction)

Request Filename: _____ (Opt)
Result Filename:  _____ (Opt)

Compact JSON Y/N: Y           Avatax Request Time Out (secs): 10

Debug Y/N: Y Debug Filename: /tmp/graham.txt
                              (e.g /tmp/mydebug.txt)

F3=Exit F12=Cancel
```

If your test and production systems are on the same IBMi server then you can either modify the setting in entry you have been using for testing or you can use option 3 to copy a service (to a different company code) and set that to point to the production server. This way you can have both production and test applications residing on the same box. See example for the 'create' service below which has a test company under company 1 and a production company under company 2.

RV2001R

Maintain Avalara System Control File

6/05/17

15:19:28

Type option, press Enter.

2=Edit 3=Copy 4=Delete 5=Display T=Test Credentials

Opt	Company Code	Operation	Environment	Active
-	1	adjust	Sandbox	Y
-	1	commit	Sandbox	Y
-	1	create	Sandbox	Y
-	1	resolve	Sandbox	Y
-	1	transactions	Sandbox	Y
-	1	void	Sandbox	Y
-	2	adjust	Sandbox	Y
-	2	commit	Sandbox	Y
-	2	create	Production	Y

F1=Info F3=Exit F6=Add

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## Appendix A: SDK Parameters

Field Name	Size/Type	Input or Output	Description
<b>Tax Document Header</b>			
<b>TaxHdr</b>			
type	25a	Input	Document Type: if not specified, a document with type of SalesOrder will be created by default = ['SalesOrder', 'SalesInvoice', 'PurchaseOrder', 'PurchaseInvoice', 'ReturnOrder', 'ReturnInvoice', 'InventoryTransferOrder', 'InventoryTransferInvoice', 'ReverseChargeOrder', 'ReverseChargeInvoice', 'Any'],
code	50a	Input	Transaction Code - the internal reference code used by the client application. This is used for operations such as Get, Adjust, Settle, and Void. If you leave the transaction code blank, a GUID will be assigned to each transaction.
companyCode	50a	Input	Specify the code of the company creating this transaction here. If you leave this value null, your account's default company will be used instead.
date	10a	Input	The date on the invoice, purchase order, etc. ,
salesPersnCd	10a	Input	The client application salesperson reference code.
customerCode	50a	Input	The client application customer reference code.
custUseType	25a	Input	The client application customer or usage type. For a list of available usage types, see <a href="https://developer.avalara.com/avatax/handling-tax-exempt-customers/">https://developer.avalara.com/avatax/handling-tax-exempt-customers/</a>
discount	15p	Input	The discount amount to apply to the document. This value will be applied only to lines that have the discounted flag set to true. If no lines have discounted set to true, this discount cannot be applied
purchOrdNo	50a	Input	Purchase Order Number for this document This is required for single use exemption certificates to match the order and invoice with the certificate.
exemptNo	25a	Input	Exemption Number for this document.
shipFrmline1	50a	Input	Ship From Address line 1
shipFrmline2	50a	Input	Ship From Address line 2

shipFrmline3	50a	Input	Ship From Address line 3
shipFrmCity	50a	Input	Ship From City
shipFrmRegn	2a	Input	Ship From State or province name or abbreviation
shipFrmCntry	3a	Input	Ship From Country Code
shipFrmPstCd	10a	Input	Ship From Postal or ZIP code
shipFrmLat	10p	Input	Ship From Latitude
shipFrmLong	10p	Input	Ship From Longitude
shipToline1	50a	Input	Ship To Address line 1
shipToline2	50a	Input	Ship To Address line 2
shipToline3	50a	Input	Ship To Address line 3
shipToCity	50a	Input	Ship To City
shipToRegn	2a	Input	Ship To State or province name or abbreviation
shipToCntry	3a	Input	Ship To Country Code
shipToPstCd	10a	Input	Ship To Postal or ZIP code
shipToLat	10p	Input	Ship To Latitude
shipToLong	10p	Input	Ship To Longitude
parameters	96a	Input	Special parameters for this transaction.
rptLocCode	50a	Input	Sets the sale location code (Outlet ID) for reporting this document to the tax authority.
commit	5a	Input	Causes the document to be committed if true. This option is only applicable for invoice document types, not orders.
batchCode	10a	Input	BatchCode for batch operations.
taxOvrType	25a	Input	Specifies a tax override for the entire document
taxOvrAmt	15p	Input	Override amount
taxOvrDate	10a	Input	Override date
taxOvrRsn	25a	Input	Override reason
currencyCde	3a	Input	Currency Code - 3 character ISO 4217

serviceMode	25a	Input	Specifies whether the tax calculation is handled Local, Remote, or Automatic (default). This only applies when using an AvaLocal server. = ['Automatic', 'Local', 'Remote'] string Enum: "Automatic", "Local", "Remote"
exchangeRate	15p	Input	Currency exchange rate from this transaction to the company base currency.
exRteEffDate	10a	Input	Effective date of the exchange rate
posLaneCode	10a	Input	Sets the POS Lane Code sent by the User for this document.
busIdNumber	25a	Input	AT business identification number for the customer for this transaction. This number will be used for all lines in the transaction, except for those lines where you have defined a different business identification number. If you specify a VAT business identification number for the customer in this transaction and you have also set up a business identification number for your company during company setup, this transaction will be treated as a business-to-business transaction for VAT purposes and it will be calculated according to VAT tax rules
isSellrIOR	5a	Input	Specifies if the Transaction has the seller as IsSellerImporterOfRecord
description	256a	Input	Description
email	50a	Input	e-mail address
debugLevel	15a	Input	If the user wishes to request additional debug information from this transaction, specify a level higher than 'normal' = ['Normal', 'Diagnostic']
id	20i	Output	The unique ID number of this transaction
companyId	20i	Output	The unique ID number of the company that recorded this transaction
paymentDate	10a	Output	The date when payment was made on this transaction. By default, this should be the same as the date of the transaction
taxDate	10a	Output	The date on which this transaction occurred
status	10a	Output	The status of the transaction = ['Temporary', 'Saved', 'Posted', 'Committed', 'Cancelled', 'Adjusted', 'Queued', 'PendingApproval', 'Any']
custVndCode	25a	Input	Customer Vendor Code

reconciled	5a	Output	If this transaction has been reconciled against the company's ledger, this value is set to true
locationCode	10a	Input	If this transaction was made from a specific reporting location, this is the code string of the location. For customers using Returns, this indicates how tax will be reported according to different locations on the tax forms
totAmount	15p	Output	The total amount of this transaction
totExempt	15p	Output	The amount of this transaction that was exempt
totTax	15p	Output	The total tax calculated for all lines in this transaction
totTaxable	15p	Output	The portion of the total amount of this transaction that was taxable
totTaxCalcd	15p	Output	If a tax override was applied to this transaction, indicates the amount of tax Avalara calculated for the transaction
adjReason	35a	Input	If this transaction was adjusted, indicates the unique ID number of the reason why the transaction was adjusted. = ['NotAdjusted', 'SourcingIssue', 'ReconciledWithGeneralLedger', 'ExemptCertApplied', 'PriceAdjusted', 'ProductReturned', 'ProductExchanged', 'BadDebt', 'Other', 'Offline']
adjDesc	128a	Input	If this transaction was adjusted, indicates a description of the reason why the transaction was adjusted
locked	5a	Output	If this transaction has been reported to a tax authority, this transaction is considered locked and may not be adjusted after reporting.
region	2a	Output	The two character ISO region code of the region for this transaction
country	2a	Output	The two-character ISO 3166 code of the country for this transaction
version	5i	Output	If this transaction was adjusted, this indicates the version number of this transaction. Incremented each time the transaction is adjusted.
softwareVer	15a	Output	The software version used to calculate this transaction
originAddrId	20i	Output	The unique ID number of the origin address for this transaction
destAddrId	20i	Output	The unique ID number of the destination address for this transaction

modifiedDate	24a	Output	The date/time when this record was last modified
modifiedBy	20i	Output	The user ID of the user who last modified this record

Field Name	Size/Type	Input or Output	Description
<b>Tax Document Lines</b>			
<b>TaxLin</b>			
id	20i	Output	The unique ID number of this transaction
transId	20i	Output	The unique ID number of the company that recorded this transaction
lineNumber	10a	Input	Line number within this document
bndryOvrId	20i	Output	The unique ID number of the boundary override applied to this line item
custUseType	25a	Input	The client application customer or usage type. For a list of available usage types, see <a href="https://developer.avalara.com/avatax/handling-tax-exempt-customers/">https://developer.avalara.com/avatax/handling-tax-exempt-customers/</a>
Description	200a	Input	A description of the item or service represented by this line
shipFrmline1	50a	Input	Ship From Address line 1
shipFrmline2	50a	Input	Ship From Address line 2
shipFrmline3	50a	Input	Ship From Address line 3
shipFrmCity	50a	Input	Ship From City
shipFrmRegn	2a	Input	Ship From State or province name or abbreviation
shipFrmCntry	3a	Input	Ship From Country Code
shipFrmPstCd	10a	Input	Ship From Postal or ZIP code
shipFrmLat	10p	Input	Ship From Latitude
shipFrmLong	10p	Input	Ship From Longitude
shipToline1	50a	Input	Ship To Address line 1
shipToline2	50a	Input	Ship To Address line 2
shipToline3	50a	Input	Ship To Address line 3
shipToCity	50a	Input	Ship To City
shipToRegn	2a	Input	Ship To State or province name or abbreviation
shipToCntry	3a	Input	Ship To Country Code
shipToPstCd	10a	Input	Ship To Postal or ZIP code
shipToLat	10p	Input	Ship To Latitude
shipToLong	10p	Input	Ship To Longitude
discAmount	15p	Output	The amount of discount that was applied to this line item. This represents the difference between list price and sale price of the item. In general, a discount represents money that did not change hands; tax is calculated on only the amount of money that changed hands
discTypeld	20i	Input	The type of discount, if any, that was applied to this line item
exemptAmt	15p	Input	The amount of this line item that was exempt
exemptCertId	20i	Input	The unique ID number of the exemption certificate that applied to this line item
exemptNo	25a	Input	If this line item was exempt, this string contains the word 'Exempt'



isItmTaxable	5a	Output	True if this item is taxable
isSSTP	5a	Output	True if this item is a Streamlined Sales Tax line item
itemCode	50a	Input	Item Code (SKU)
lineAmount	15p	Input	The total amount of the transaction, including both taxable and exempt. This is the total price for all items. To determine the individual item price, divide this by quantity.
Quantity	15p	Input	The quantity of products sold on this line item
ref1	50a	Input	Reference 1 - Client specific reference field
ref2	50a	Input	Reference 2 - Client specific reference field
reportDate	10a	Output	The date when this transaction should be reported. By default, all transactions are reported on the date when the actual transaction took place. In some cases, line items may be reported later due to delayed shipments or other business reasons
revenueAcct	50a	Input	The revenue account number for this line item
Sourcing	15a	Output	Indicates whether this line item was taxed according to the origin or destination. = ['Mixed', 'Destination', 'Origin']
Tax	15p	Output	The amount of tax generated for this line item
taxableAmt	15p	Output	The taxable amount of this line item
taxCalcd	15p	Output	The tax calculated for this line by Avalara. If the transaction was calculated with a tax override, this amount will be different from the "tax" value
taxCode	25a	Input	The code string for the tax code that was used to calculate this line item
taxCodeId	20i	Output	The unique ID number for the tax code that was used to calculate this line item
taxDate	10a	Output	The date that was used for calculating tax amounts for this line item. By default, this date should be the same as the document date. In some cases, for example when a consumer returns a product purchased previously, line items may be calculated using a tax date in the past so that the consumer can receive a refund for the correct tax amount that was charged when the item was originally purchased
taxEngine	35a	Output	The tax engine identifier that was used to calculate this line item
exemptCode	25a	Input	Exemption number for this line
discounted	5a	Input	True if the document discount should be applied to this line
taxIncluded	5a	Input	True if tax was included in the purchase price of the item.
busIdNumber	25a	Input	VAT business identification number used for this transaction
taxOvrType	25a	Input	If a tax override was specified, this indicates the type of tax override. = ['None', 'TaxAmount', 'Exemption', 'TaxDate', 'AccruedTaxAmount', 'DeriveTaxable']
taxOvrAmt	15p	Input	If a tax override was specified, this indicates the amount of tax that was requested
taxOvrDate	10a	Input	Tax Override Date
taxOvrRsn	25a	Input	Tax Override Reason
parameters	96a	Output	Contains a list of extra parameters that were set when the transaction was created



Field Name	Size/Type	Input or Output	Description
<b>Tax Document Addresses</b>			
<b>TaxAdr</b>	DS		
id	20i	Output	The unique ID number of this address
transId	20i	Output	The unique ID number of the document to which this address belongs
boundaryLev	15a	Output	The boundary level at which this address was validated. = ['Address', 'Zip9', 'Zip5']
line1	50a	Output	Address line 1
line2	50a	Output	Address line 2
line3	50a	Output	Address line 3
city	50a	Output	City
region	2a	Output	State or province name or abbreviation
postalCode	10a	Output	Country Code
country	3a	Output	Postal or ZIP code
latitude	10p	Output	Latitude
longitude	10p	Output	Longitude

Field Name	Size/Type	Input or Output	Description
<b>Tax Document Detail</b>			
<b>TaxDet</b>			
id	20i	Output	The unique ID number of this tax detail
transId	20i	Output	The unique ID number of the line within this transaction
country	2a	Output	The two character ISO 3166 country code of the country where this tax detail is assigned
region	2a	Output	The two-or-three character ISO region code for the region where this tax detail is assigned
exemptAmt	15p	Output	The amount of this line that was considered exempt in this tax detail
jurisCode	35a	Output	The code of the jurisdiction to which this tax detail applies
jurisName	50a	Output	The name of the jurisdiction to which this tax detail applies
stateAssNo	35a	Output	The state assigned number of the jurisdiction to which this tax detail applies
jurisType	35a	Output	The type of the jurisdiction to which this tax detail applies. = ['STA', 'CTY', 'CIT', 'STJ', 'CNT']
nonTaxAmt	15p	Output	The amount of this line item that was considered nontaxable in this tax detail
rate	7p	Output	The rate at which this tax detail was calculated
tax	15p	Output	The amount of tax for this tax detail
taxableAmt	15p	Output	The taxable amount of this tax detail
taxType	35a	Output	The type of tax that was calculated. Depends on the company's nexus settings as well as the jurisdiction's tax laws. = ['Lodging', 'Bottle', 'ConsumerUse', 'Excise', 'Fee', 'Input', 'Nonrecoverable', 'Output', 'Rental', 'Sales', 'Use']
taxName	50a	Output	The name of the tax against which this tax amount was calculated
taxAuthTypId	20i	Output	The type of the tax authority to which this tax will be remitted
taxCalcd	15p	Output	The amount of tax that was calculated. This amount may be different if a tax override was used. If the customer specified a tax override, this calculated tax value represents the amount of tax that would have been charged if Avalara had calculated the tax for the rule
rateType	35a	Output	(DEPRECATED) The rate type for this tax detail. Please use rateTypeCode instead. = ['ReducedA', 'ReducedB', 'Food', 'General', 'IncreasedStandard', 'LinenRental', 'Medical', 'Parking', 'SuperReduced', 'ReducedR', 'Standard', 'Zero']

Field Name	Size/Type	Input or Output	Description
<b>Tax Summary</b>			
<b>TaxSum</b>			
country	2a	Output	Two character ISO-3166 country code
region	2a	Output	Two or three character ISO region, state or province code, if applicable
jurisType	35a	Output	The type of jurisdiction that collects this tax. = ['Country', 'Composite', 'State', 'County', 'City', 'Special']
jurisCode	35a	Output	Jurisdiction Code for the taxing jurisdiction
jurisName	50a	Output	The name of the jurisdiction that collects this tax
taxAuthType	35a	Output	The unique ID of the Tax Authority Type that collects this tax
stateAssNo	35a	Output	The state assigned number of the jurisdiction that collects this tax
taxType	35a	Output	The tax type of this tax. = ['Lodging', 'Bottle', 'ConsumerUse', 'Excise', 'Fee', 'Input', 'Nonrecoverable', 'Output', 'Rental', 'Sales', 'Use']
taxName	50a	Output	The name of the tax
taxGroup	50a	Output	Group code when special grouping is enabled
rateType	35a	Output	(DEPRECATED) Indicates the tax rate type. Please use rateTypeCode instead. = ['ReducedA', 'ReducedB', 'Food', 'General', 'IncreasedStandard', 'LinenRental', 'Medical', 'Parking', 'SuperReduced', 'ReducedR', 'Standard', 'Zero']
taxable	15p	Output	Tax Base - The adjusted taxable amount.
rate	7p	Output	Tax Rate - The rate of taxation, as a fraction of the amount.
tax	15p	Output	Tax amount - The calculated tax (Base * Rate).
taxCalcd	15p	Output	Tax Calculated by Avalara AvaTax. This may be overridden by a TaxOverride.TaxAmount.
nonTaxable	15p	Output	The amount of the transaction that was non-taxable.
exempt	15p	Output	The amount of the transaction that was exempt

Field Name	Size/Type	Input or Output	Description
<b>Tax Error Messages</b>			
<b>TaxMsg</b>			
code	32a	Output	Message identifier
message	64a	Output	A summary of what this message tells us
description	128a	Output	Detailed information that explains what the summary provided
refersTo	64a	Output	Information about what object in your request this message refers to
severity	32a	Output	A category that indicates how severely this message affects the results

## Appendix E: Managing Digital Certificates

This process will guide you through setting up the Digital Certificate Manager to enable your IBM i to interact as a client to other external servers requiring SSL connections.

1. Note that 5722AC3 (Crypto Access Provider 128-bit) or equivalent must be installed as a LICPGM first.
2. Make sure your HTTP \*ADMIN server is running. You can verify that the \*ADMIN instance is started by issuing the following command:

```
WRKSBSJOB SBS (QHTTPSVR)
```

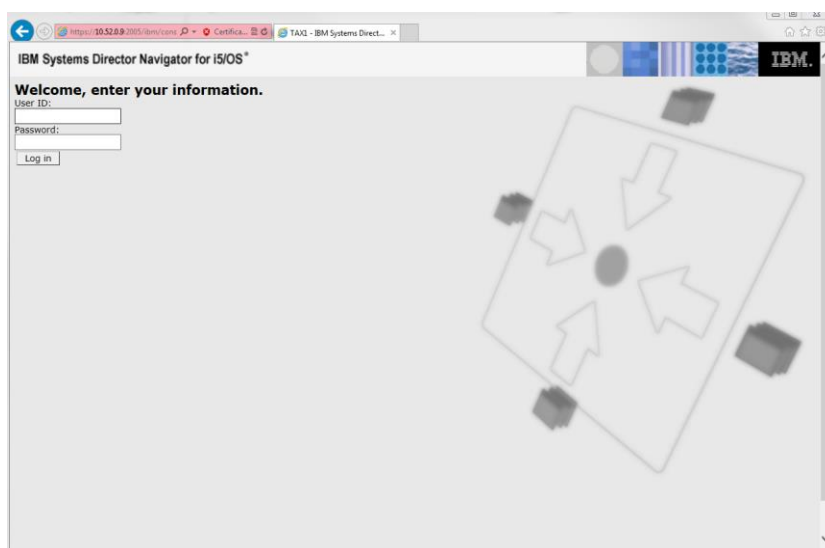
3. You can start the \*ADMIN server by issuing this command:

```
STRTCPSVR SERVER (*HTTP) HTTPSVR (*ADMIN)
```

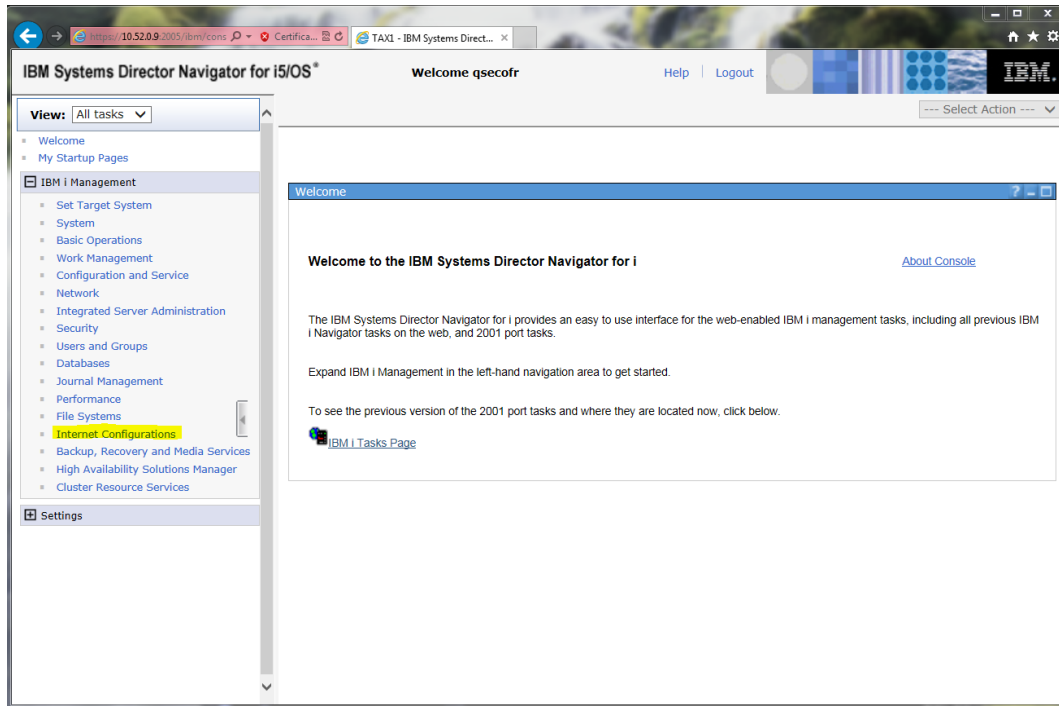
4. Open Windows Explorer and type <http://<iseriesipaddress>:2001> in the address bar. This should bring up the navigator sign on screen. Sign on as a security officer.

For release V7R1 and greater if the above does not work then try this format.

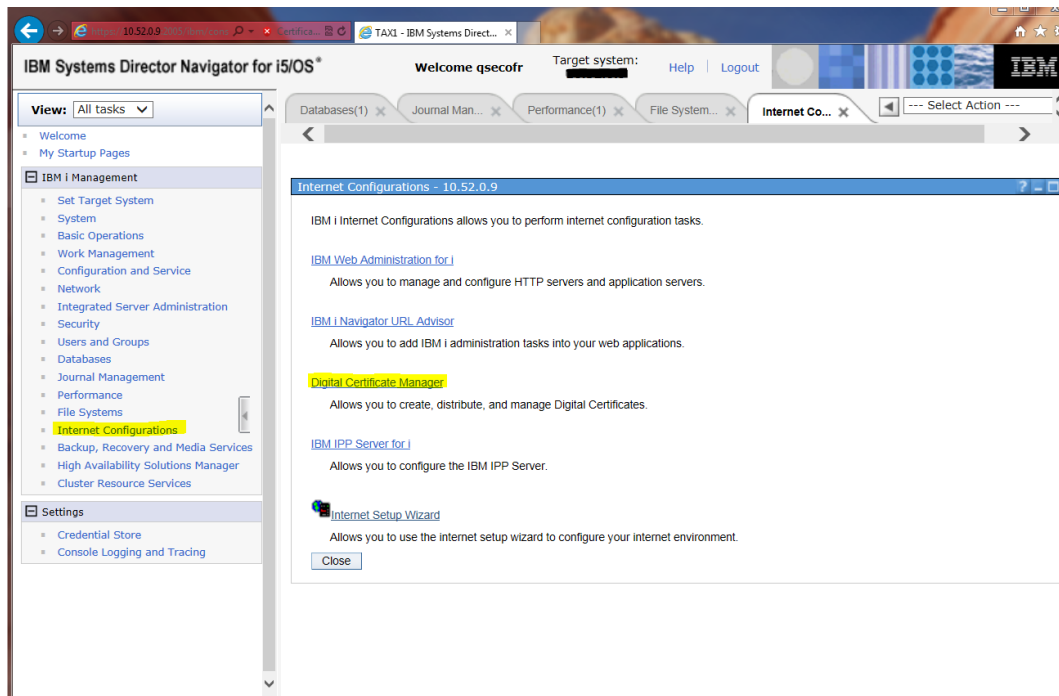
<http://<Your IBM IP Address>:2001/QIBM/ICSS/Cert/Admin/qycucm1.ndm/main0>



## Select internet configurations



## Select Digital Certificate Manager

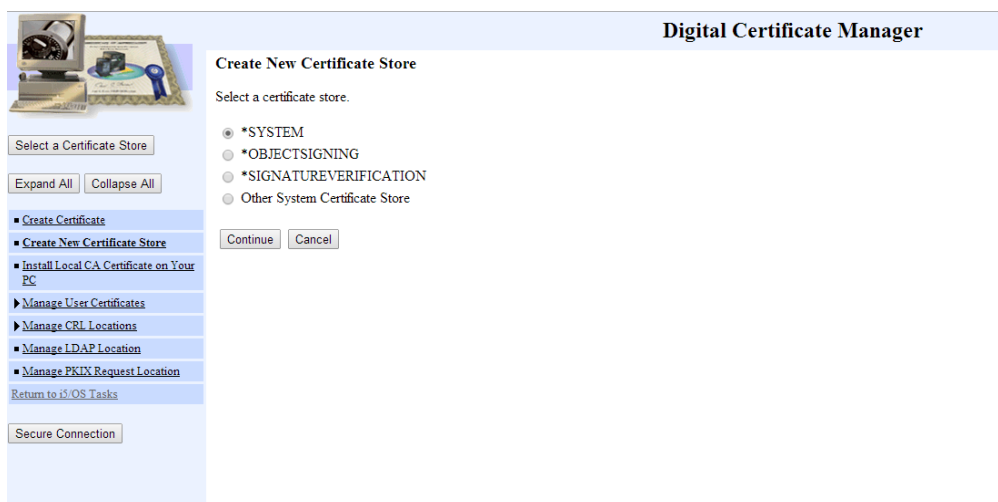





Try to create a New Certificate store



If you already have a \*System store then you will not see \*SYSTEM in the selection list. If you do see it (like the example below) create a new one. Select \*SYSTEM and hit continue.



Click 'No – Do not create a certificate in the certificate store' and continue. The system will create the store with a selection of certificates from the major Cert Authorities, which should be sufficient to connect with the Avalara service. Then follow the prompts to create certificate store.



## Digital Certificate Manager

IBM

### Create a Certificate in New Certificate Store

**Certificate store:** Other System Certificate Store

The new certificate store will contain the default list of Certificate Authority (CA) certificates. Do you want to create a certificate in the certificate store?

☐ **Yes** - Create a certificate in the certificate store.  
☒ **No** - Do not create a certificate in the certificate store.


Select a Certificate Store

Expand All Collapse All

- Create Certificate
- Create New Certificate Store
- Install Local CA Certificate on Your PC
- Manage User Certificates
- Manage CRL Locations
- Manage LDAP Location
- Manage PKIX Request Location
- Return to i5/OS Tasks

Secure Connection

Once your \*System store is created you can view it using the Work with Certificates option. The certificate authority you need is the Verisign Class 3 shown below.



## Digital Certificate Manager

IBM

### Work with CA Certificates

**Certificate type:** Certificate Authority (CA)  
**Certificate store:** \*SYSTEM

Select a certificate, then select a button to perform an action on the certificate.

If you want to include a CA in the CA trust list for an application, select a CA from the list below and click the Enable button. A list of applications will display and you can select the applications that should include this CA in the application's CA trust list.

	Certificate Authority (CA)	Status
<input type="radio"/>	LOCAL_CERTIFICATE_AUTHORITY_065E4EP1(1)	Enabled
<input type="radio"/>	GeoTrust Global CA	Enabled
<input type="radio"/>	GeoTrust True Credentials CA 2	Enabled
<input type="radio"/>	Equifax Secure Certificate Authority	Enabled
<input type="radio"/>	Equifax Secure eBusiness CA-1	Enabled
<input type="radio"/>	Equifax Secure eBusiness CA-2	Enabled
<input type="radio"/>	Equifax Secure Global eBusiness CA-1	Enabled
<input type="radio"/>	Microsoft Root Authority	Enabled
<input type="radio"/>	Thawte Personal Premium CA	Enabled
<input type="radio"/>	Thawte Personal Freemail CA	Enabled
<input type="radio"/>	Thawte Personal Basic CA	Enabled
<input type="radio"/>	Thawte Premium Server CA	Enabled
<input type="radio"/>	Thawte Server CA	Enabled
<input type="radio"/>	Verisign Class 1 Public Primary Certification Authority	Enabled
<input type="radio"/>	Verisign Class 2 Public Primary Certification Authority	Enabled
<input checked="" type="radio"/>	Verisign Class 3 Public Primary Certification Authority	Enabled

Update CRL Location Assignment

Select a Certificate Store

Expand All Collapse All

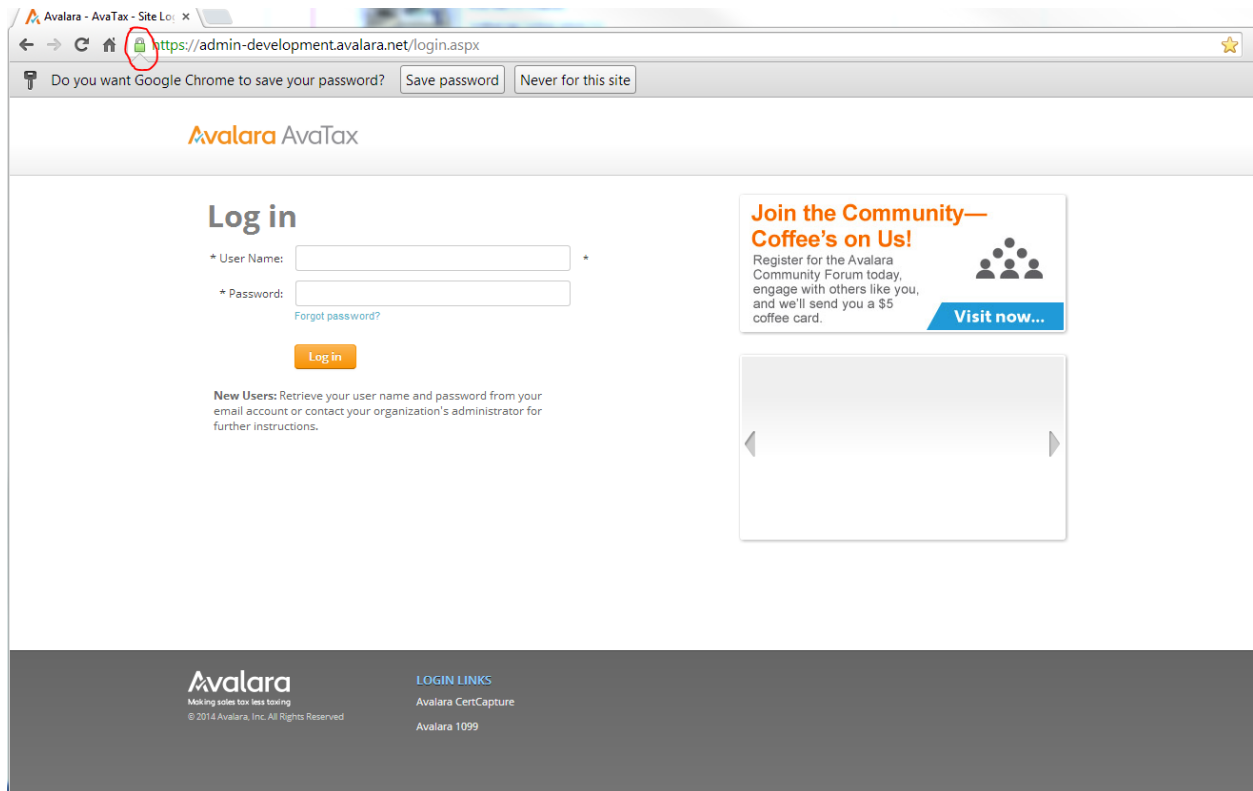
- Fast Path
  - Work with server and client certificates
  - Work with CA certificates
  - Work with user certificates
  - Work with certificate requests
  - Work with server applications
  - Work with client applications
  - Work with CRL locations
- Create Certificate
- Create New Certificate Store
- Install Local CA Certificate on Your PC
- Manage Certificates
- Manage Applications
- Manage Certificate Store
- Manage CRL Locations
- Manage LDAP Location
- Manage PKIX Request Location
- Return to i5/OS Tasks

Secure Connection

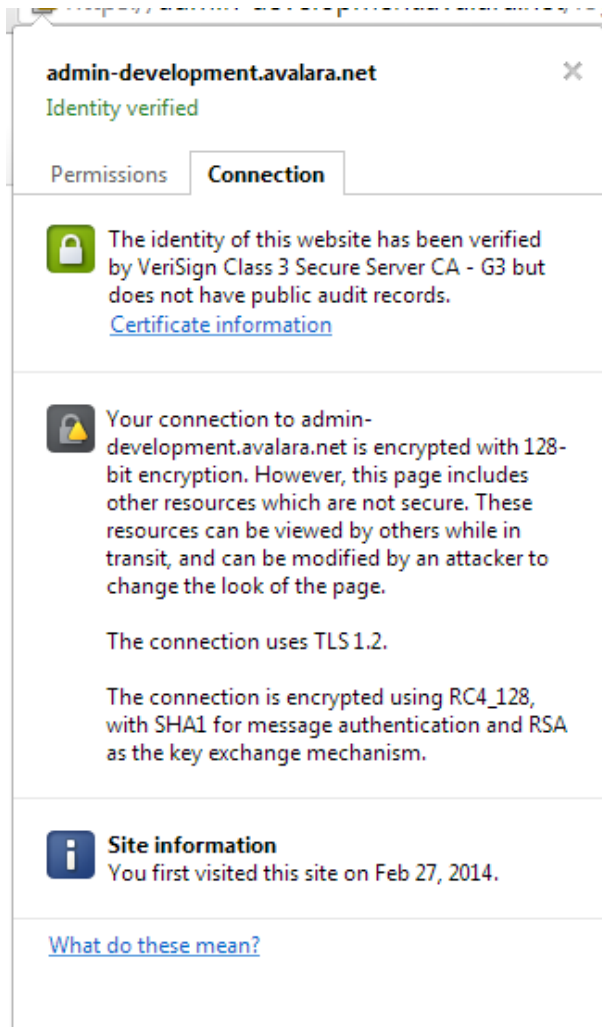
That should be all you need to do for setting up the certificate store apart from ensuring that your users have authorization access.

If, by any chance, you do not see the Verisign Class 3 CA in your store like the example above you will need to import it following the instructions below.

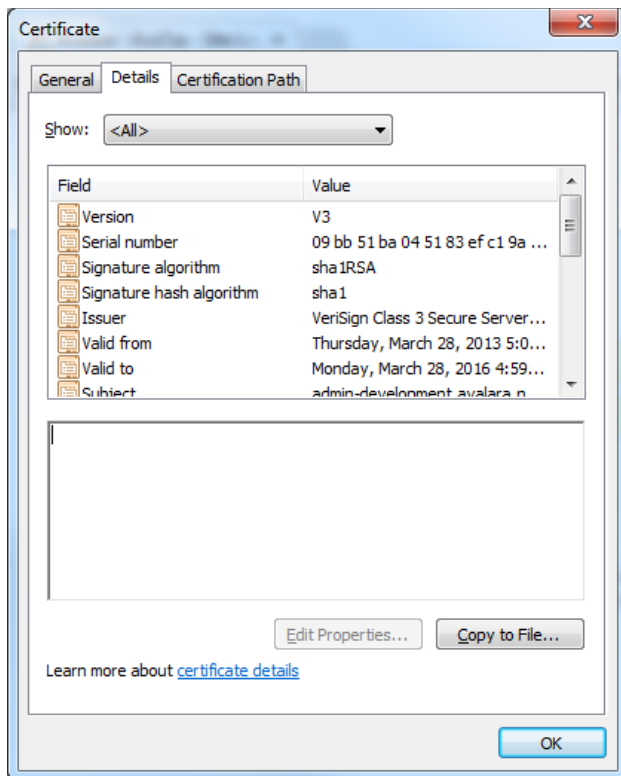
Go to our development console login page. Note the green padlock in the address bar.



Right click on the padlock and select the connection tab to display the drop down below. Click on [Certificate information](#).



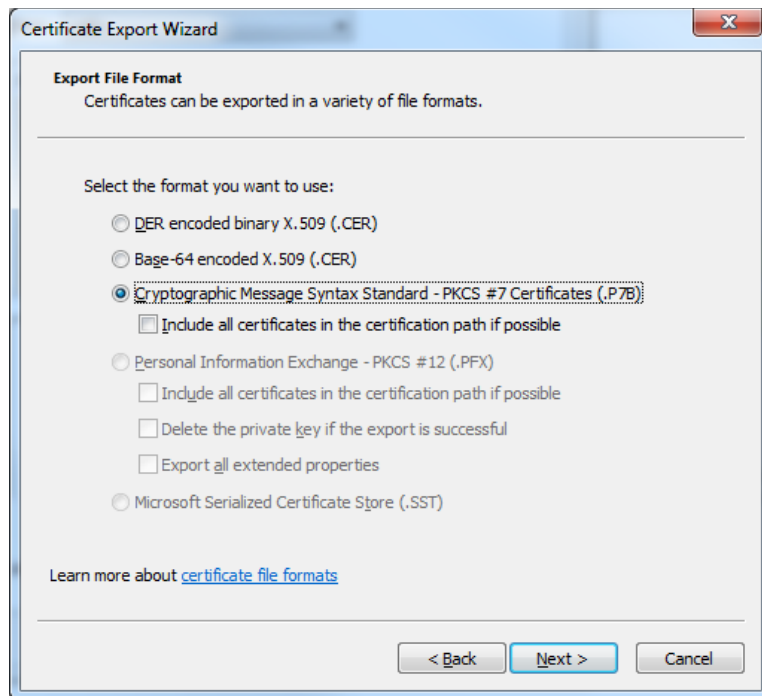
Click on the Details tab and then the 'Copy to File' button. This will start the Certificate Export Wizard.



Click Next >

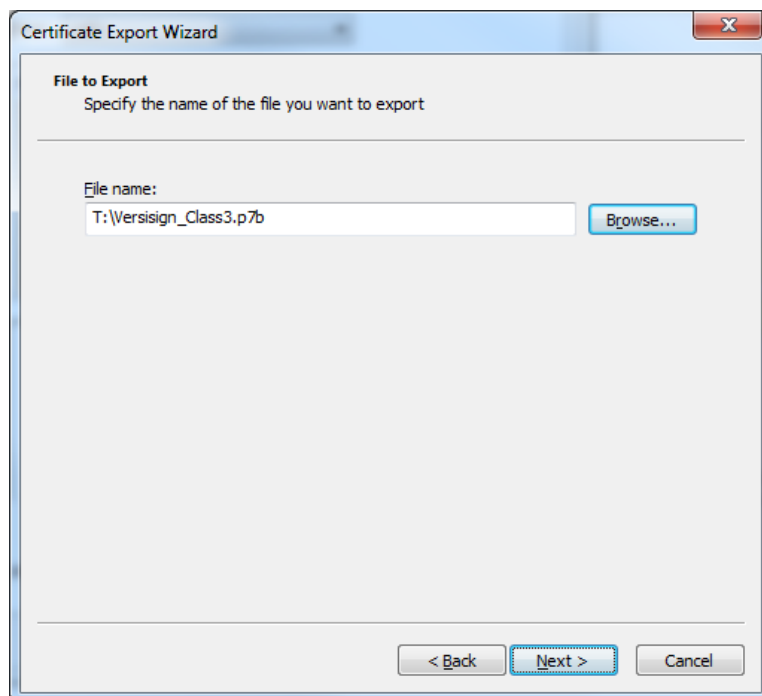


Select the .P7B format. Hit Next >

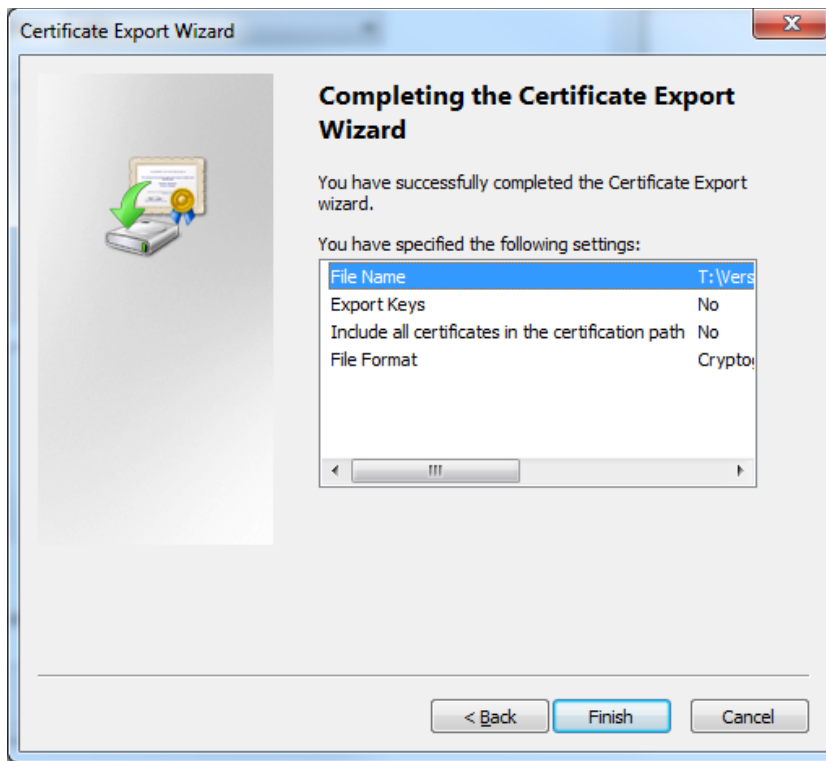


Give the file a location and save name (we recommend saving in the /tmp directory of your IFS).

Hit next >



Hit Finish and you should get an 'Export Successful' message.



Now go back to DCM and select the \*SYSTEM store



Enter your password

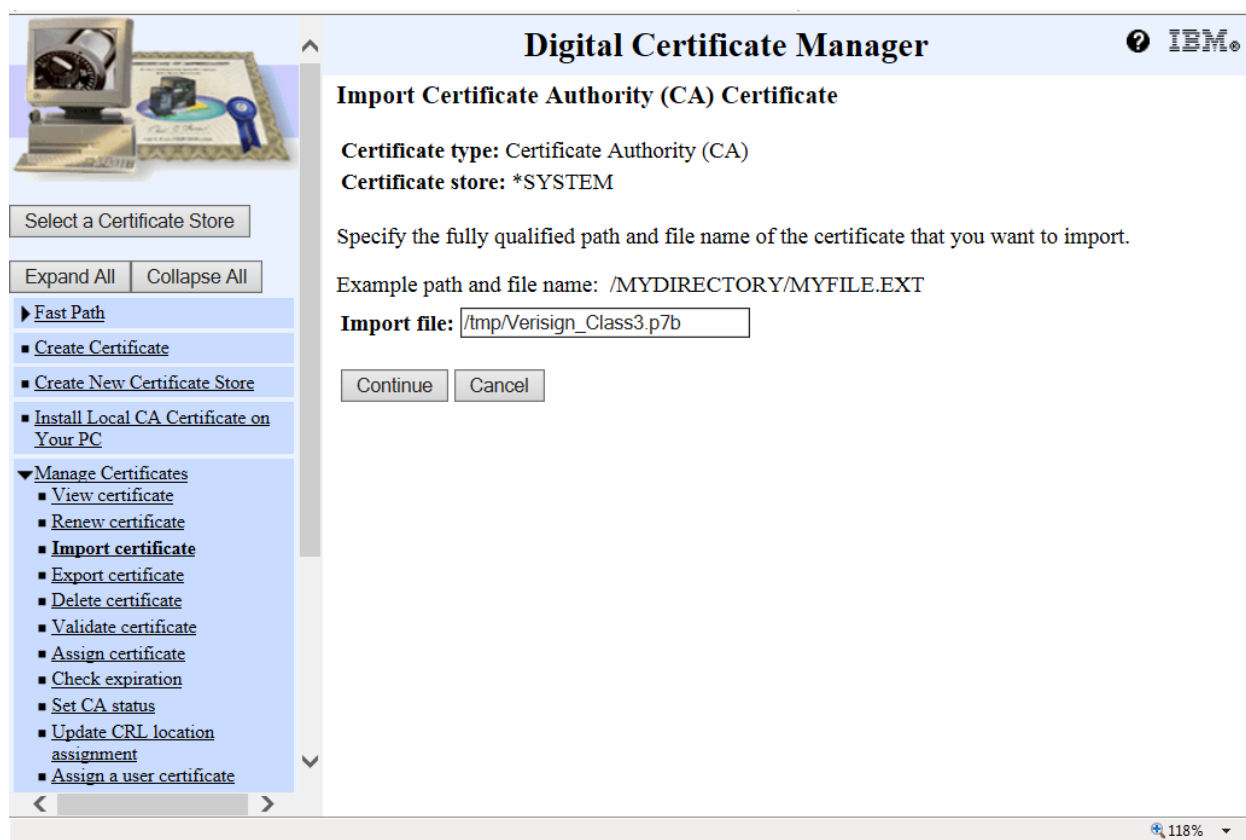


Select Import Certificate > Certificate Authority (CA)

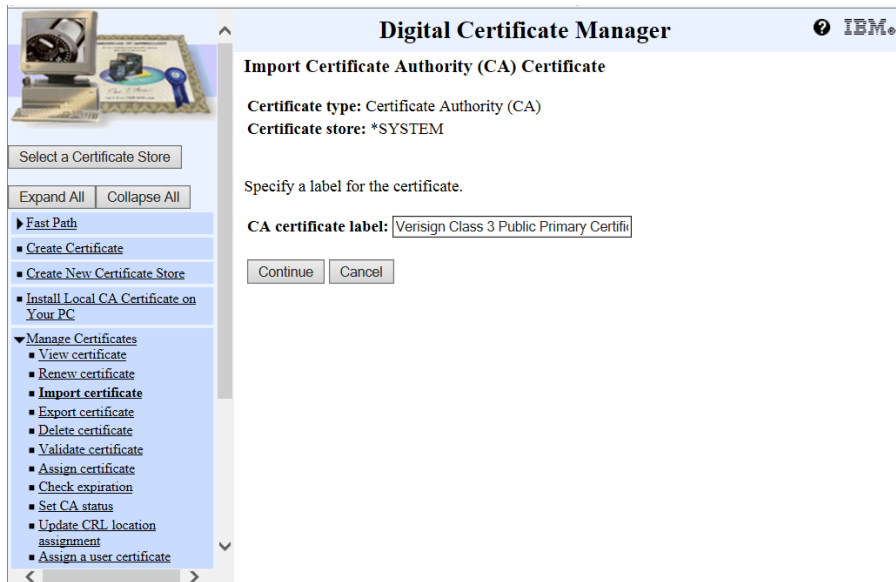




Enter the location and name of the import file that you saved above.



Specify a label ... you may want to use **Verisign Class 3 Public Primary Certification Authority** which matches what we have. Hit Continue.



If it all works ok you should get a confirmation message like this.



## Appendix F: Address Validation Service

Avalara also provides an address validation service for USA and Canada addresses. An address validation SDK is included with your install library.

The address service can also be called separately, perhaps at the time that you enter or modify an address within your system. See the source for RPGLE program RV2006R as an example. This program can be seen running from the Inquiry menu.

RV2010R is a simple skeleton application that can be used to quickly develop a program that will read through your address database and cleanse the addresses. This will correct errors in names or zips, add zip+4, convert case to a standard format etc. To use this program look at the source in AVATAXR2/QRPGLESRC RV2010R and follow the instructions in the program.

## Appendix G: Entity Control File

Maintenance option 2. Maintain Entity Control file gives you access to a table who's primary function is to provide a conversion between ISO 3166 alpha-3 codes and alpha-2 codes, The SDK address and tax adapters automatically convert an incoming country code to ISO 3166-2 at runtime. This is the format used by Avalara.

By default, the table is set up with only alpha-2 codes. If your calling application passes alpha-3 codes you can configure the table, via the maintenance option, to create a conversion between alpha-3 and alpha-2. Below is an example of how you would configure the table to handle the USA ISO 3166-3 code. The US entry was copied and the ISO3 value set to USA. Now whenever USA is passed as the country code the adapter will convert it to US before calling the service.

```
AC0004R1                Maintain Entity Control File                11/04/14
                                                                    15:12:33

Type option, press Enter.
 2=Edit  3=Copy  4=Delete  5=Display

   US  _  <= Position
Opt ISO3 Typ ISO2 Entity Name          Cur Addr
   Cde  Chk?
-  US   1  US   United States          USD  N
-  USA  1  US   United States          USD  N
-  UY   1  UY   Uruguay                UYU  N
-  UZ   1  UZ   Uzbekistan             UZS  N
-  VA   1  VA   Vatican City           EUR  N
-  VC   1  VC   Saint Vincent and the  XCD  N
                  Grenadines
-  VE   1  VE   Venezuela              VEF  N
-  VG   1  VG   British Virgin Islands USD  N
-  VI   1  VI   U.S. Virgin Islands    USD  N
-  VN   1  VN   Vietnam               VND  N
-  VU   1  VU   Vanuatu               VUV  N
-  WF   1  WF   Wallis and Futuna      XPF  N
-  WS   1  WS   Samoa                 WST  N
-  XXX  1  US   United States          USD  N
                                     More...

F3=Exit  F6=Add
Copyright 2004-2014 Avalara, Inc. All Rights Reserved
```

The Entity Control file also contains currency code information.

If you are using address validation at tax calculation time (controlled by the flag on the System Control file) then you can fine tune the level of validation performed by setting the Address Check flag in this file. So, for example, you could perform address validation for the United States but not for Canada, or you could choose to only validate addresses in California.

## Appendix H: Change Log

Release	Date	Changes
V1.0	July 2017	Initial Release
V1.1	July 2017	<p>Changed the format of the TaxSum, TaxAdr, TaxMsg and TaxLin data structures. Formerly they were addressed using this format TaxLin(i).taxrate. This has now changed to TaxLin.taxrate(i).</p> <p>This resolves an issue with debug being unable to handle the previous form of the TaxLin data structure. The other structures were changed for consistency.</p>
V1.2	July 2017	Increased field size of the meta data “id” fields. Some customers were experiencing “receiver too small” errors.
V1.3	July 2017	Enhancements to installer program.
V1.4	Sept 2017	Minor changes to the Integration Tester
V1.5	Sept 2017	Corrected errors in documentation relating to field size specification. Removed ExemptNo from the TaxLin data structure – use exemptCode instead. Increased the size of Taxhdr. modifiedDate to 24A to accommodate full date/timestamp.
V1.6	Oct 2017	<p>Fixed issue where adapter would not calculate tax if it was not in debug mode.</p> <p>Added 3 ‘Easy Operations’. These pre-built functions make it simple to retrieve the jurisdiction breakdown for a Canadian transaction, to Void a document and to Commit a document. See the section on ‘Easy Operations’ for more details.</p>
V1.7	Nov 2017	<p>Added a feature to enhance time out resilience. The tax adapter now traps time out conditions, sets the time out value to 30 seconds and retries sending the document 5 times. If there is no success after 5 attempts a time out error is returned to the caller. See the section on ‘<b>Time Outs</b>’ for more details.</p> <p>Added an additional Easy Operation to retrieve a previously submitted documents details. See the section <b>Retrieve Document Details</b> for more information.</p>
V1.8	Dec 2017	<p>This includes enhancements to the time out feature. Addresses the condition where the results of a ‘create’ transaction are not returned to the caller due to a time out. However, the transaction was successfully created in Avatax and subsequent attempts to send the transaction again result in a ‘<b>DocStatus is invalid for this operation.</b>’ Error. The adapter will now automatically detect that a time out has occurred and that details were not returned to the caller. In this situation, it will attempt to retrieve the transaction details and return them to the caller who will see it as a normal transaction. If after 5 attempts the adapter cannot retrieve the details it will return a time out error.</p> <p>This release also includes a feature that allows a developer to force a time out situation which will allow them to test their error handling capabilities. See the section on ‘<b>Time Outs</b>’ for more details.</p>
V1.9	Jan 2018	<p>Modified the SDK adapter to use the ‘createoradjust’ version of the create operation. For more details go to ...</p> <p><a href="https://developer.avalara.com/api-reference/avatax/rest/v2/methods/Transactions/CreateOrAdjustTransaction/">https://developer.avalara.com/api-reference/avatax/rest/v2/methods/Transactions/CreateOrAdjustTransaction/</a></p>

V1.10	Feb 2018	<ol style="list-style-type: none"> <li>1) This version of the SDK should play happily with any other versions of the HTTPAPI open source software that you might have on your system.</li> <li>2) Includes a new 'Easy Operation' for creating a full invoice refund. See the section in this document covering Easy Operations.</li> </ol>
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## Avalara Support

If you have questions about SalesTaxII, please contact Avalara Support with our toll free number (1-877) 780-4848, option 2. Standard support hours are 7:00 a.m. to 4:00 p.m. Pacific, Monday through Friday.

Requests for assistance can also be placed online via email at [taxrates.support@avalara.com](mailto:taxrates.support@avalara.com) or via chat at <http://www.avalara.com/Technical-Support>.