Practical Exercise: Create a WebSocket API

Training Objective

Learn how to create and use WebSocket APIs

Business Scenario

PizzaShack wants to implement a WebSocket API.

High-Level Steps

- Create and Publish a WebSocket API
- Use the wscat WebSocket client to invoke the API

Detailed Instructions

Create and Publish a WebSocket API

This tutorial will guide you to implement a WebSocket based chat application using the WSO2 API Manager. Follow the instructions in this tutorial to design and publish API via a WebSocket backend, and thereafter invoke the WebSocket API using the **wscat** WebSocket client.

This will demonstrate a simple command line based chat room which has two channels: **rooms**, and **notifications**.

Note

When you create a WebSocket Streaming API it's exposed via both `ws` and `wss` protocols. By default, the `ws` transport uses port 9099, and the `wss` transport uses port 8099.

Step 1 - Design a WebSocket API

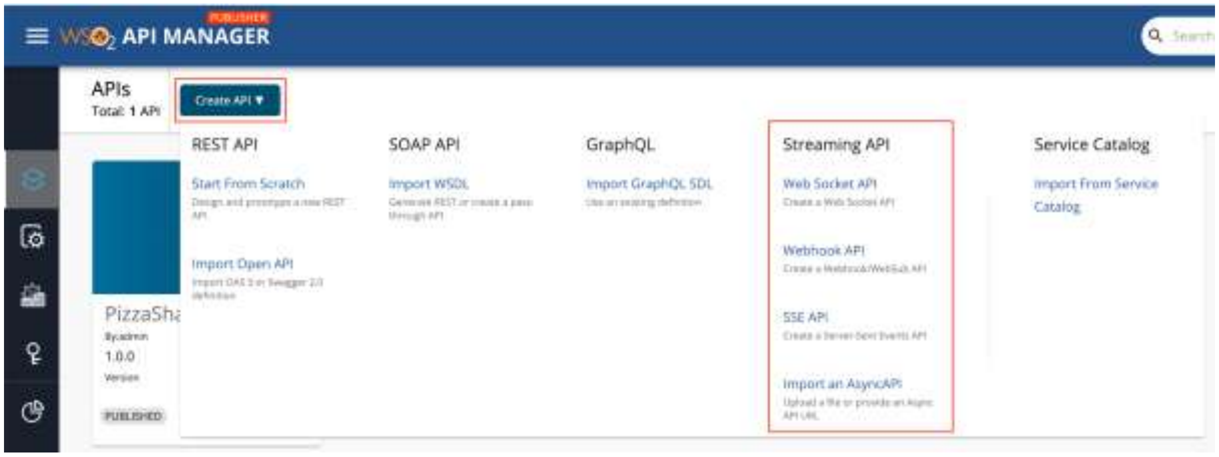
1. Sign in to the Publisher.

   `https://<hostname>:9443/publisher`
   For testing purposes, you can use `https://localhost:9443/publisher` and `admin` as the username and password.

2. Click **Create API**, go to **Streaming API**, and click **WebSocket API**.

   Note

   The **Create** button will only appear for a user who has the `creator` role permission.



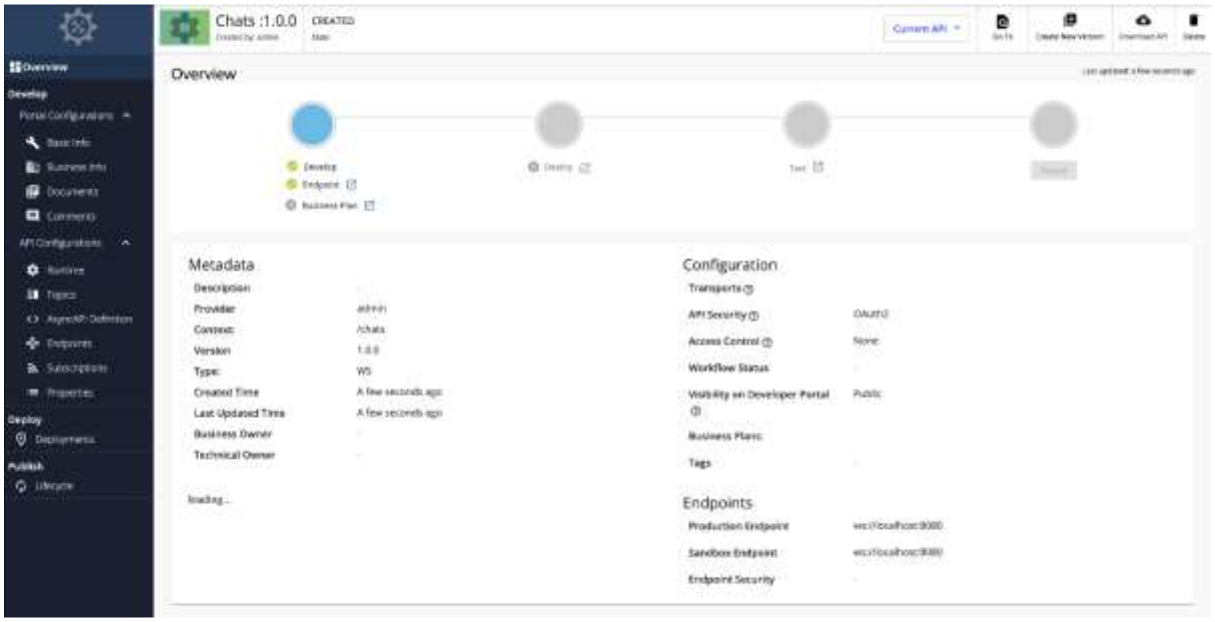
3. Enter the details of the new WebSocket API.

Field	**Sample value**
Name	Chats
Context	/chats
Version	1.0.0
Protocol	WebSocket
Endpoint	ws://localhost:8080

4. **Note**
   - When you create a WebSocket Streaming API it's exposed via both ws and wss protocols. By default, ws transport uses port 9099, and wss transport uses port 8099.
   - For non-secured WebSockets enter the protocol as `ws://` in the endpoint, or for secured WebSockets enter the protocol as `wss://`

5. Click **CREATE**.

   The overview page of the created WebSocket API appears.



Metadata

Description	-
Provider	admin
Context	/chats
Version	1.0.0
Type	WS
Created Time	A few seconds ago
Last Updated Time	A few seconds ago
Business Owner	-
Technical Owner	-

loading...

Configuration

Transports	
API Security	OAuth2
Access Control	None
Workflow Status	-
Visibility on Developer Portal	Public
Business Plans	
Tags	-

Endpoints

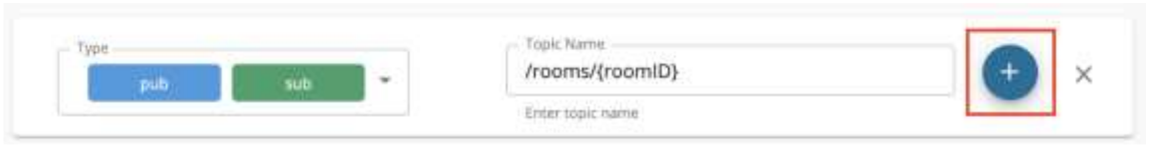
Production Endpoint	ws://localhost:8080
Sandbox Endpoint	ws://localhost:8080
Endpoint Security	-

6. Add topics to the WebSocket API.
   a. Click **Topics** and navigate to the Topics page.
   b. Delete the existing default topic, which has the name `/*`.

c. Add the following topics one by one.

Select **pub** and **sub** as the **Types**, enter the **Topic Name**, and click **+** to add each topic.

- /notifications
- /rooms/{roomID}



Type

pub sub

Topic Name

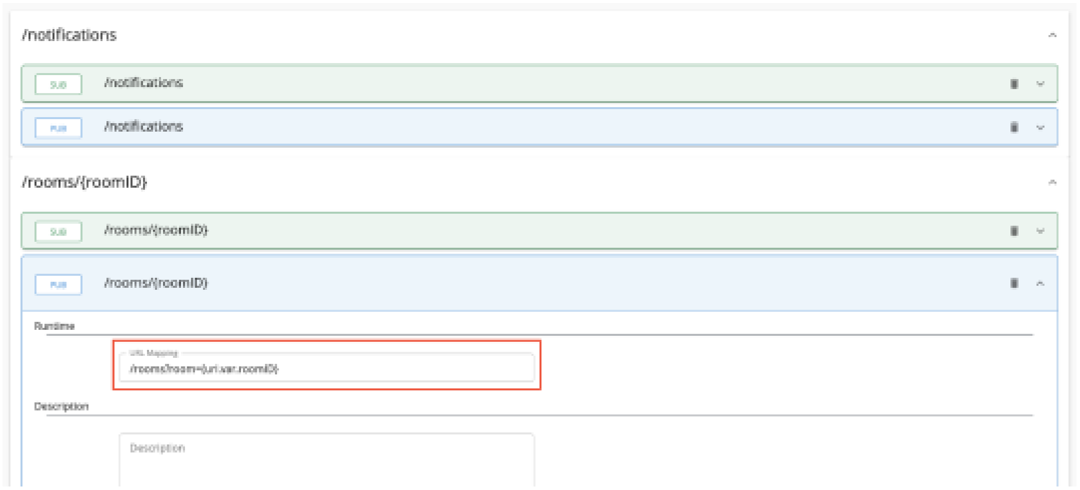
/rooms/{roomID}

Enter topic name

d. Expand each topic, provide URL Mappings as follows, and click **Save**.

Topic	URL Mapping
/notifications	/notifications
/rooms/{roomID}	/rooms?room={uri.var.roomID}

e. URL Mapping provided for a topic will be appended to the WebSocket endpoint URL, which was provided when creating the API, and the traffic via the topic will be sent to & received from the resulting URL.



/notifications

SUB /notifications

PUB /notifications

/rooms/{roomID}

SUB /rooms/{roomID}

PUB /rooms/{roomID}

Runtime

URL Mapping

/rooms?room={uri.var.roomID}

Description

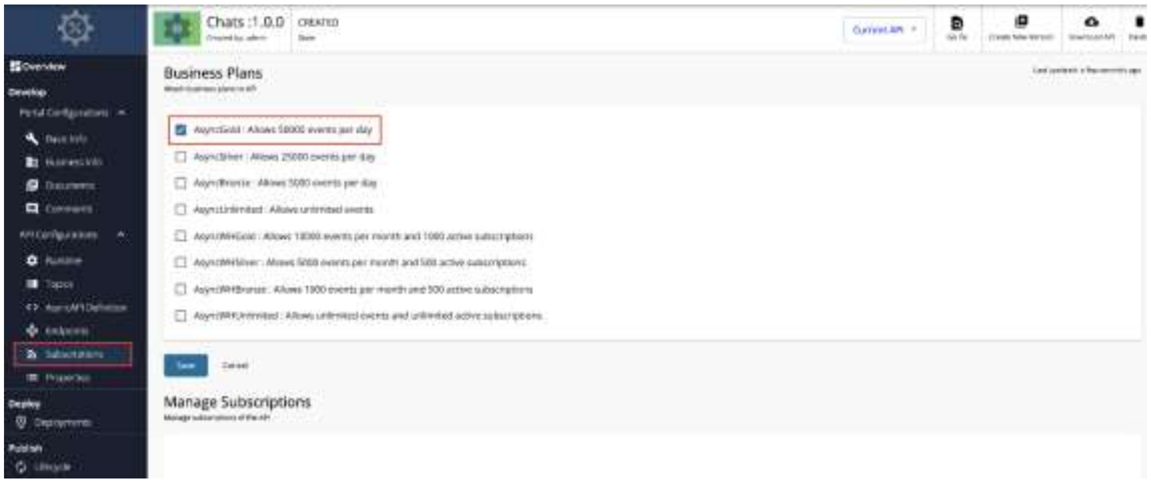
Description

f.

7. Attach business plans to your WebSocket API.

   . Click **Subscriptions** and navigate to the Business Plans page.

   a. Select **AsyncGold** and click on **Save**.



Chats :1.0.0 CREATED

Business Plans

- [✓] AsyncGold : Allows 50000 events per day
- [ ] AsyncSilver : Allows 25000 events per day
- [ ] AsyncBronze : Allows 5000 events per day
- [ ] AsyncUnlimited : Allows unlimited events
- [ ] AsyncWHGold : Allows 10000 events per month and 1000 active subscriptions
- [ ] AsyncWHSilver : Allows 5000 events per month and 500 active subscriptions
- [ ] AsyncWHBronze : Allows 1000 events per month and 500 active subscriptions
- [ ] AsyncWHUnlimited : Allows unlimited events and unlimited active subscriptions

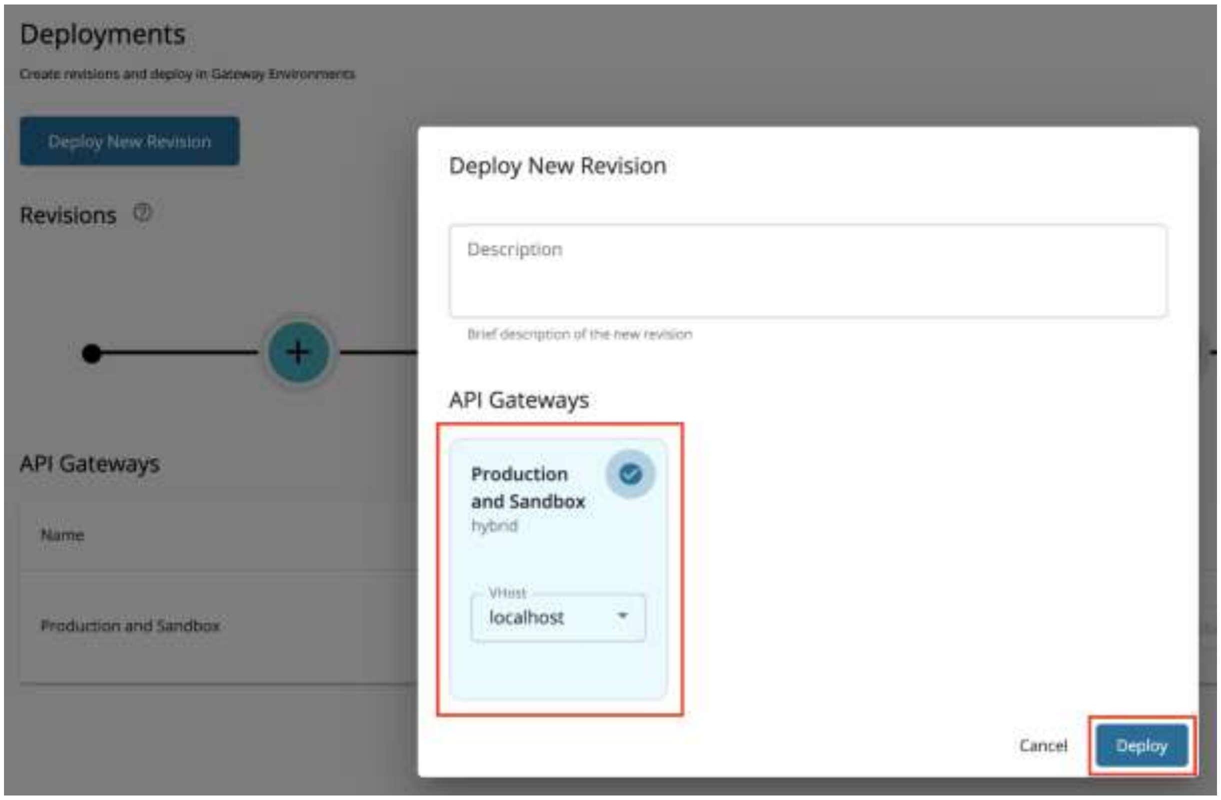
Save Cancel

Manage Subscriptions

Now, you have created and configured the WebSocket API successfully.

Step 2 - Publish the WebSocket API

1. Click **Lifecycle** to navigate to the API lifecycle, and click **Publish** to publish the API to the API Developer Portal.
2. Click **Deployments** to navigate to the Deployments page and click **Deploy New Revision**.
3. Select **Production and Sandbox**, choose **localhost** as the VHost, and click on **Deploy**.



Step 3 - Start the WebSocket Server

1. Download the sample WebSocket server from [WSO2 APIM Samples - GitHub repository]().
2. Go to the `streaming-api-backends/websocket-backend` directory, and install the required dependencies.
   ```
   npm install
   ```
3. Start the server.
   ```
   npm start
   ```

Step 4 - Invoke the WebSocket API

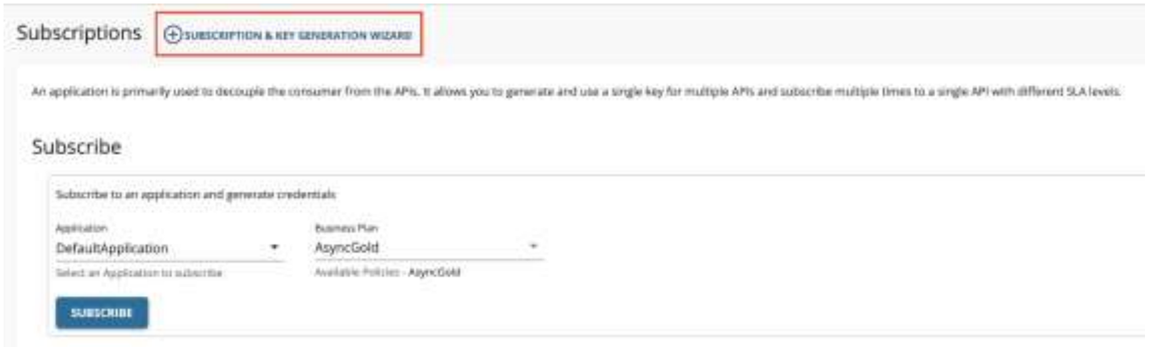
1. Sign in to the Developer Portal.
   ```
   https://<hostname>:9443/devportal
   ```
   For testing purposes, you can use `https://localhost:9443/devportal` and `admin` as the username and password.
2. Click on the WebSocket API.

   The API overview appears.
3. Subscribe to the API.
   a. Click **Subscriptions** to go to the Subscriptions page and click **Subscription & Key Generation Wizard**.

This wizard takes you through the steps of creating a new application, subscribing, generating keys, and generating an access token to invoke the API.

Note

You can use any application (e.g., JWT or OAuth) to subscribe to the API.



An application is primarily used to decouple the consumer from the APIs. It allows you to generate and use a single key for multiple APIs and subscribe multiple times to a single API with different SLA levels.

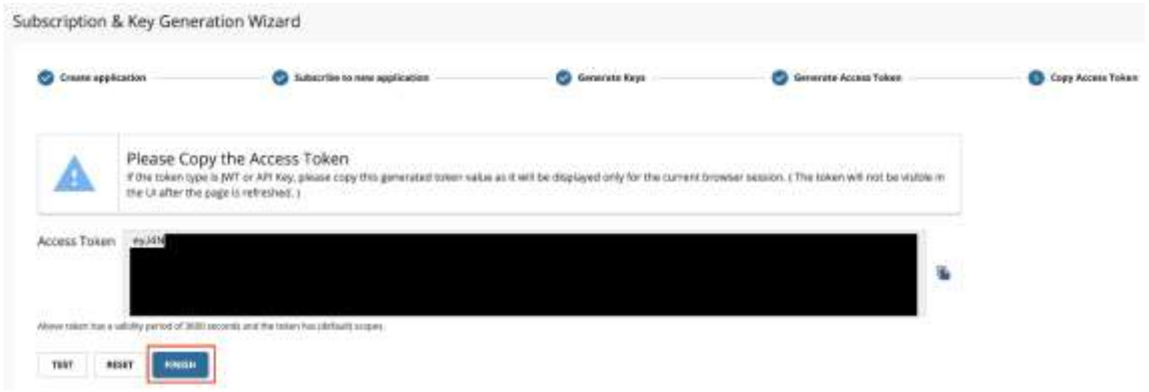
Subscribe

Subscribe to an application and generate credentials

Application: DefaultApplication
Select an Application to subscribe

Business Plan: AsyncGold
Available Policies - AsyncGold

b. Copy the authorization token that appears, and click **Finish**.


Subscription & Key Generation Wizard

Please Copy the Access Token
If the token type is JWT or API Key, please copy this generated token value as it will be displayed only for the current browser session. (The token will not be visible in the UI after the page is refreshed.)

Access Token: eyJ4N [redacted]

Above token has a validity period of 3600 seconds and the token has [default] scopes.

4. Try out the operations.

a. Install **wscat** client.

```
npm install -g wscat
```

b. Invoke the API's `/notifications` topic with an authorization header by executing the following command.

WS

```
wscat -c ws://localhost:9099/chats/1.0.0/notifications -H
"Authorization: Bearer [accesstoken]"
```

WSS

When the connection is successful, the WebSocket server will send:

```
Subscribed to notifications!
```

c. In a separate terminal, invoke the API's `/rooms/{roomID}` topic with an authorization header by executing the following command.

WS

```
wscat -c ws://localhost:9099/chats/1.0.0/rooms/room1 -H "Authorization:
Bearer [accesstoken]"
```

WSS

When the connection is successful, the WebSocket server will send:

```
You joined room1!
```

This denotes that the first user has connected to `room1`.
Additionally, the following message will be shown in the terminal where you invoked the `/notifications` topic. This denotes the notification for the above event.

```
Someone joined room1!
```

d. In another terminal, invoke the API's `/rooms/{roomID}` topic again. This denotes the second user, who will be connecting to `room1`.

WS

```
wscat -c ws://localhost:9099/chats/1.0.0/rooms/room1 -H "Authorization: Bearer [accesstoken]"
```

WSS

You will receive the message: `You joined room1!` in this terminal, along with the corresponding notification in the `notifications` terminal.
As there are two users connected to `room1`, both of them can send and receive chats via `room1`. Try sending messages from both of these terminals back and forth.

Note

There are clients (especially browsers) that do not allow you to add headers to the WebSocket handshake. In such cases, you can send the access token for the WebSocket API invocation as a query parameter named `access_token` by using the command below:

WS

```
wscat -c
"ws://localhost:9099/chats/1.0.0/notifications?access_token=[accesstoken
]"
```

WSS

Note

`BasicAuth` and `API Key` do not work for the security of WebSocket APIs.

You have successfully created and published your first WebSocket API, subscribed to it, obtained an access token for testing, and tested your API with the access token.