Develop IoT clients

This guide shows you how to use the IoT SDK to develop client applications and to register them with AM. It also shows you how to build the IoT Gateway.

Develop a client

Develop a client application with the IoT SDK.

Requirements

Build the IoT Gateway for your target system.

ForgeRock Identity Platform™ serves as the basis for our simple and comprehensive Identity and Access Management solution. We help our customers deepen their relationships with their customers, and improve the productivity and connectivity of their employees and partners. For more information about ForgeRock and about the platform, see https://www.forgerock.com.

Develop a client application with the IoT SDK

This section shows you how to create a client application for a thing, named Gopher. The thing is manually registered in AM and authenticated with a username/password authentication flow. For more information about the IoT SDK API, refer to the Go package documentation.

Develop the application

These steps assume that you have installed the required software and cloned the things GitHub repository:

1. Create a directory structure for your Go project:

```
mkdir -p things/cmd/gopher
```

2. Create an empty project file (`main.go`):

```
cd things
touch cmd/gopher/main.go
```

3. Open `main.go` in a text editor, and add the following code:

```
package main

import (
    "github.com/ForgeRock/iot-edge/v7/pkg/builder"
    "github.com/ForgeRock/iot-edge/v7/pkg/callback"
    "log"
    "net/url"
)

func main() {
    amURL, err :=
url.Parse("http://am.localtest.me:8080/openam")
    if err != nil {
        log.Fatal(err)
    }
    _, err = builder.Thing().
        ConnectTo(amURL).
        InRealm("/").
        WithTree("Example").
        HandleCallbacksWith(
            callback.NameHandler{Name: "Gopher"},
            callback.PasswordHandler{Password:
"5tr0ngG3n3r@ted"}).
        Create()
    if err != nil {
        log.Fatal(err)
    }
    log.Println("Gopher successfully authenticated.")
}
```

4. Create a Go module:

```
go mod init example.com/things && go mod tidy
go: creating new go.mod: module example.com/things
go: to add module requirements and sums:
        go mod tidy
go: finding module for package github.com/ForgeRock/iot-
edge/v7/pkg/callback
go: finding module for package github.com/ForgeRock/iot-
```

```
edge/v7/pkg/builder
go: found github.com/ForgeRock/iot-edge/v7/pkg/builder in
github.com/ForgeRock/iot-edge/v7 v7.4.0
go: found github.com/ForgeRock/iot-edge/v7/pkg/callback in
github.com/ForgeRock/iot-edge/v7 v7.4.0
```

This step creates a `go.mod` file that specifies your project dependencies and versions.

5. Build an executable for your client application:

```
go build example.com/things/cmd/gopher
```

This step builds an executable `gopher` application in the `things` directory.

Run the application

1. Before you can run the application, you must register an identity for Gopher in AM:
   - Get an admin SSO token from AM:

```
curl \
--header 'X-OpenAM-Username: amAdmin' \
--header 'X-OpenAM-Password: changeit' \
--header 'Content-Type: application/json' \
--header 'Accept-API-Version: resource=2.0, protocol=1.0'
\
--request POST \
'http://am.localtest.me:8080/openam/json/authenticate'
{
 "tokenId": "qGAzvBw20z5…AAA.*",
 "successUrl": "/openam/console",
 "realm": "/"
}
```

   - Save the `tokenId` returned in this request as a variable, for example:

```
export tokenId=qGAzvBw20z5…AAA.*
echo $tokenId
qGAzvBw20z5…AAA.*
```

   - Register the Gopher application, with the ID `Gopher`:

```
curl \
--header 'Content-Type: application/json' \
```

```
--header 'Accept-Api-Version: resource=4.0, protocol=2.1'
\
--cookie "iPlanetDirectoryPro=${tokenId}" \
--data '{
    "userPassword": "5tr0ngG3n3r@ted",
    "thingType": "device"
}' \
--request PUT \
"http://am.localtest.me:8080/openam/json/realms/root/users
/Gopher"
{
  "_id": "Gopher",
  "_rev": "-1",
  "realm": "/",
  "username": "Gopher",
  "uid": [
    "Gopher"
  ],
  "universalid": [
    "id=Gopher,ou=user,dc=openam,dc=forgerock,dc=org"
  ],
  "objectClass": [
    "iplanet-am-managed-person",
    "inetuser",
    "fr-iot",
    "sunFMSAML2NameIdentifier",
    "inetorgperson",
    "devicePrintProfilesContainer",
    "iplanet-am-user-service",
    "iPlanetPreferences",
    "pushDeviceProfilesContainer",
    "forgerock-am-dashboard-service",
    "organizationalperson",
    "top",
    "kbaInfoContainer",
    "person",
    "sunAMAuthAccountLockout",
    "oathDeviceProfilesContainer",
    "webauthnDeviceProfilesContainer",
    "iplanet-am-auth-configuration-service",
    "deviceProfilesContainer"
  ],
  "dn": [
    "uid=Gopher,ou=people,dc=openam,dc=forgerock,dc=org"
  ],
```

```
  "inetUserStatus": [
    "Active"
  ],
  "cn": [
    "Gopher"
  ],
  "sn": [
    "Gopher"
  ],
  "thingType": [
    "device"
  ],
  "createTimestamp": [
    "20200831103235Z"
  ]
}
```

Log in to the AM admin UI and select **Identities** in the Top Level Realm, to refer to the `Gopher` identity in the list.

2. Run the executable to authenticate your application to AM:

```
./gopher
2020/09/01 11:09:49 Gopher successfully authenticated.
```

Build the ForgeRock IoT Gateway

ForgeRock doesn't provide binaries for the IoT Gateway. There are simply too many operating system and architecture combinations to support. The IoT Gateway and the IoT SDK are developed in the Go programming language primarily because it has easy build tooling and good support for cross-compilation to target systems.

Build the IoT Gateway on a target system

These steps assume that you have installed the required software and cloned the Things GitHub repository:

1. On your target system, go to the `gateway` directory:

```
cd /path/to/iot-edge/cmd/gateway
```

2. Build the IoT Gateway binary:

```
go build -o ./bin/gateway .
```

The IoT Gateway binary is now available at `bin/gateway`

3. Run the IoT Gateway with the `--help` flag for available command-line options:

```
./bin/gateway --help
Usage:
  gateway [OPTIONS]

Application Options:
      --url=      AM URL
      --realm=    AM Realm
      --audience= JWT Audience
      --tree=     Authentication tree
      --name=     Gateway name
      --address=  CoAP Address of Gateway
      --key=      The file containing the Gateway's signing
key
      --kid=      The Gateway's signing key ID
      --cert=     The file containing the Gateway's
certificate
      --timeout=  Timeout for AM communications (default: 5s)
  -d, --debug     Switch on debug

Help Options:
  -h, --help      Show this help message
```

Cross-compile the IoT Gateway for a target system

You can specify a target system with a combination of the `$GOOS` and `$GOARCH` environment variables. This lets you build the IoT Gateway for a variety of operating system and architecture combinations.

This example runs the IoT Gateway on an `arm` 32-bit processor (for example, a Raspberry Pi 3 running in 32-bit mode).

1. Build the IoT Gateway for `linux/arm`, as follows:

```
GOOS=linux GOARCH=arm go build -o ./bin/linux_arm/gateway .
```

2. For a complete list of environment and cross-compilation targets, refer to the go Documentation.

   For more build options, refer to the go command environment variables.