Connector Installation Guide

PlanetCross Connector

This manual is currently reference document. Officially, please check the Japanese one.

PlanetCross Connector can easily create X-Road Services from SQL. It works with MySQL/MariaDB, PostgreSQL, SQLite, Oracle, IBM DB2 and Microsoft SQL Server.

Contents

1. Introduction

1.1 What is Connector?

Connector is the adapter service to convert simple SQL toward RDB into PlanetCross service.

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1.2 How it works

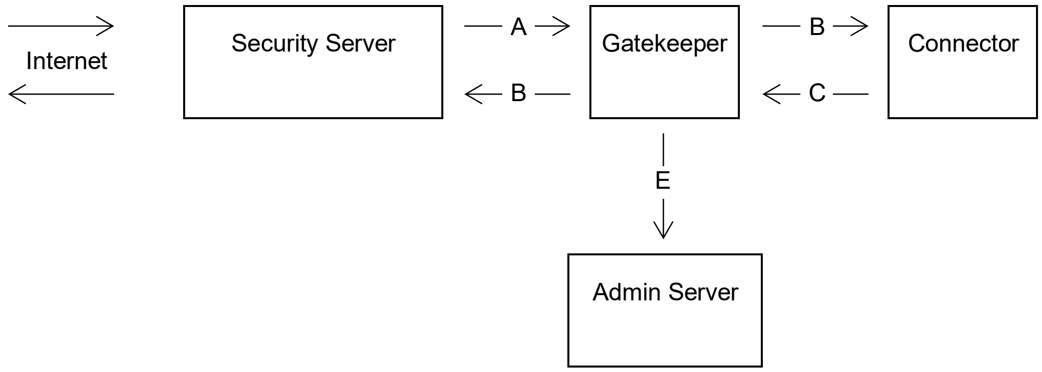


Fig.1 Connector related network

Connector runs two webservers, one SOAP server to handle SOAP requests and Admin server to provide UI for service configuration.

Security Server sends SOAP requests to Connector (A),
Connector sends SQL query to database (B) and receives rows (C),
generates a SOAP response and sends it back to the Security Server (D).

Admin server provides a web UI for configuring services, which service administrators use (E).
After service configuration is done, Connector saves the service configuration in a file, generates a WSDL URL which Security Servers can fetch (A) to publish the service.

1.3 About OS difference which we have supported

Connector v4.2.0 (PlanetCross v1.2.0) supports Red Hat Enterprise Linux and Ubuntu.
There are some difference between both one such as some commands, so please take a look at a chapter and text.

2. Installation

2.1 Prerequisites

Connector runs on x86_64 architecture machine with following OS.

All connector version support following Ubuntu and need following resources.

Operating System	Ubuntu 16.04 x86-64
CPU	2 core
RAM	4GB
Free disk space	1GB

All connector version support following Ubuntu and need following resources.

Operating System	RHEL7.2 x86-64
CPU	2 core
RAM	4GB
Free disk space	1GB

For Oracle Database, official libraries are required.
Please follow "2.7 Oracle Instant Client installation".

2.2 Network configuration

Configure your network so that following TCP connections reach it's destination.

A,D. Security server to connector

Security server sends SOAP requests to connector, and connector responds with a SOAP response.

Connector's SOAP server listens on port 8003, on all network interfaces by default, and is configurable in main-conf.json .

B,C. Connector to relational database

Connector sends SQL queries to RDBs and receive results.

E. Connector to administrators

Administrators access Connector's admin UI and configures services.

Admin server listens on port 8002, on localhost by default.

Use SSH tunnel as `ssh -L 8002:127.0.0.1:8002 connector.example.com -N` or configure main-conf.json admin.port and admin.host .

2.3 Add package repository server

Add package repository server.

There is a difference between Ubuntu and RHEL.

In case of Ubuntu, refer to "2.3.1 Ubuntu".

In case of RHEL, refer to "2.3.2 RHEL".

2.3.1 Ubuntu

Register apt-key using following commands.

# Enter one line.

```
$ sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv-keys
731E775DF768EF67
```

Please, make sure that "Planetway Ops <apt@pwlvc.com></apt@pwlvc.com>" has been registered.

```
$ sudo apt-key list
```

<Example>

```
/etc/apt/trusted.gpg
--------------------
(…)

pub   4096R/F768EF67 2017-10-31
uid                  Planetway Ops <apt@pwlvc.com>
sub   4096R/254BD796 2017-10-31
```

Next step, register package repository server.

NB: After 20.01.2020, don't have to enter {username} and {password}.
Enter one line.

```
$ sudo sh -c 'echo "deb [arch=amd64] https://deb.planetcross.net/planetx
trusty non-free" > /etc/apt/sources.list.d/planetx.list'
```

Please, make sure that registered contents are accurate.

```
$ cat /etc/apt/sources.list.d/planetx.list
```

<Example>

```
deb [arch=amd64] https://deb.planetcross.net/planetx trusty non-free
```

2.3.1 RHEL

Register package repository server.

Create "/etc/yum.repo.d/planetx.repo" file and setup following settings.

NB: After 20.01.2020, don't have to enter {username} and {password}.

<Setup contents>

```
[planetx]
name=PlanetCross for RHEL/CentOS
baseurl=https://rpm.planetcross.net/7/
enabled=1
gpgcheck=1
gpgkey=https://static.planetcross.net/prod/gpgkey.asc
```

2.4 Installing Connector

Installing procedure is different between Ubuntu and RHEL

In case of Ubuntu, refer to "2.4.1 Ubuntu".

In case of RHEL, refer to "2.4.2 RHEL".

2.4.1 Ubuntu

Enter following commands.

```
$ sudo apt-get update
$ {Install command}*
```

* Please, refer to "Release note" which is described {Install command} depending on version.
In case of Ubuntu, must enter "apt-get update" command before installation.

2.4.2 RHEL

Enter following commands.

NB: Please, make sure "Release note" because there is a possibility that install command is different with each version.

```
$ sudo yum install planetx-connector-{version}
```

If it will be displayed confirmation message, please enter "y" several times.

If "Complete!" is displayed, installation will be complete.

Please, make sure Connector status using a following command.

```
$ sudo systemctl status planetx-connector.service
```

If the status is not active, please enter a following command due to start the service.

```
$ sudo systemctl start planetx-connector.service
```

2.5 Restarting Connector

After manually editing configuration files, restart Connector to apply the changes.

```
$ sudo systemctl restart planetx-connector.service
```

2.6 Oracle Instant Clinet instllation

Follow step 1-4 in the official instruction, Oracle Instant Client Zip, from the link.

After the these steps, restart Connector.

3. Initial configuration

Connector itself is installed in /opt/planetx/connector/ folder.

Edit `/etc/planetx/connector/main-conf.json` to configure the webservers' behaviour.

Default configration looks like this:

```
{
  "conf": "/etc/planetx/connector/services.json",

  "services":
    { "port": 8003
    , "host": "0.0.0.0"
    , "schema": "http"
    , "hostname" : null
    , "log": {
        "access"     : "/var/log/planetx/connector/pw-access.log"
    ,   "error"      : "/var/log/planetx/connector/pw-error.log"
    ,   "sql"       : "/var/log/planetx/connector/pw-sql.log"
    ,   "soapAll"    : ""
    ,   "soapHeader" : "/var/log/planetx/connector/pw-soapheader.log"
      }
    },

  "admin":
    { "port": 8002
    , "host": "127.0.0.1"
    }
}
```

Here are descriptions of config file.

- "conf": Full path to a json file which Admin server writes and SOAP server reads to handle SOAP requests.
- "services": Object to configure SOAP server.
- "services"."port": On which port it listens on.
- "services"."schema": Use either http or https.
- "services"."host": TCP host to bind (0.0.0.0 for public access).
- "services"."hostname": Hostname of the generated WSDL URL and the URL written inside the WSDL. If `null` or missing system configuration is used.
- "services"."log": Object to configure log behaviour.
- "services"."log"."access": SOAP server's HTTP access logs.
- "services"."log"."error": Error logs.
- "services"."log"."sql": SQL queriy logs.
- "services"."log"."soapAll": Whole SOAP request and response are logged to this file. If empty, logging is disabled.

- "services"."log"."soapHeader": SOAP header of request and response are logged to this file.
- "admin": Object to configure Admin server.
- "admin"."port": On which port it listens on.
- "admin"."host": TCP host to bind.

Admin server listens on localhost by default.
Change admin.host to the IP address of the network interface which you will use to access the admin server.

3.1 Apply configuration changes

Check current status of Connector.

```
$ systemctl status planetx-connector.service
 planetx-Connector.service - PlanetX Connector
   Loaded: loaded (/lib/systemd/system/planetx-connector.service; enabled;
vendor preset: enabled)
   Active: active (running) since Thu 2018-08-02 09:08:20 UTC; 34s ago
 Main PID: 1220 (node)
    Tasks: 10
   Memory: 50.9M
      CPU: 333ms
   CGroup: /system.slice/planetx-connector.service
           └─1220 /opt/planetx/connector/node/bin/node
/opt/planetx/connector/bin/planetx-Connector.js

Aug 02 09:08:20 ip-xxx-xxx-xxx-xxx systemd[1]: Started PlanetX Connector.
Aug 02 09:08:21 ip-xxx-xxx-xxx-xxx node[1220]: UI service running at ...
Aug 02 09:08:21 ip-xxx-xxx-xxx-xxx node[1220]: SOAP service running at ...
Aug 02 09:08:21 ip-xxx-xxx-xxx-xxx node[1220]: Services are not defined
```

Restart Connector to apply changes to the config file.

4. Services configuration

Open Admin server UI to configure services.
Admin server UI is at http://{host}:{admin.port}/ where {host} is the hostname or IP address which your browser can reach this server, and {admin.port} is the port number in configuration file.

Admin server UI supports following browsers.

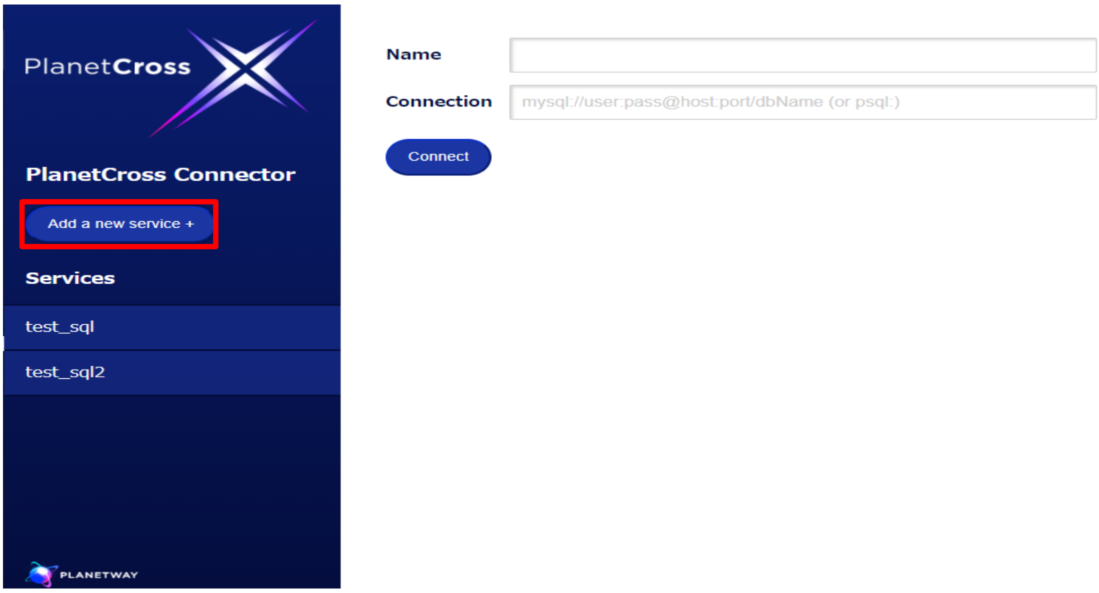
- Latest Safari
- Latest Google Chrome

NB! Internet Explorer is not supported.

4.1 Adding services

Press the "Add a new service" button on the left to start configuring a new service.

How to use details, please make sure "Connector_Setting_Guide".



Appendix A nginx for HTTPS, authentication and redundancy

Optionally use nginx or any other reverse proxy to add HTTPS for both SOAP and admin servers, and basic authentication for admin server.

nginx is not installed by default. Install it yourself if you need it.

Here is an example nginx configuration:

```
server {
  listen 443 default_server ssl;
  server_name my.host;
  ssl_certificate     your-cert.pem;
  ssl_certificate_key your-privkey.pem;

  root /opt/planetx/connector/lib/static/;

  location /planetx-connector/ {
    proxy_pass http://127.0.0.1:8003/;
  }

  location /planetx-connector-config/ {
    proxy_pass http://127.0.0.1:8002/;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection 'upgrade';
    proxy_set_header Host $host;
    proxy_cache_bypass $http_upgrade;

    auth_basic           "PlanetX Connector Config";
    auth_basic_user_file /etc/planetx/connector/htpasswd;
  }
}
```

Use "htpasswd" in the apache2-utils package to add users to access the administration server.

```
htpasswd -c /etc/planetx/connector/htpasswd username
```

For enhancing security, you can also add IP restriction function.
Example is following.

```
location /planetx-connector-config/ {
    proxy_pass http://127.0.0.1:8003/

    auth_basic           "PlanetX Connector Config";
    auth_basic_user_file /etc/planetx/connector/htpasswd;

    allow 192.168.0.1;
    deny  all;
```

Appendix B Setup for Oracle Database

This is a short description about the installation to connect Oracle Database from Connector.

1. Follow instructions here
https://oracle.github.io/odpi/doc/installation.html#oracle-instant-client-zip
steps 1-4

2. Restart connector

```
sudo systemctl restart planetx-connector.service
```

3. Done press the "Connect" button in Connector UI and it will connect,
ex: oracle://hr:hrpw@oracle-test.c4dkawusmxzx.us-east-1.rds.amazonaws.com:1521/ORCL

You may try official sample code to test Node.js module.

```
var oracledb = require('oracledb');
oracledb.getConnection(
  {
    user          : "hr",
    password      : "welcome",
    connectString : "localhost/XE"
  },
  function(err, connection)
  {
    if (err) { console.error(err); return; }
    connection.execute(
      "SELECT department_id, department_name "
    + "FROM departments "
    + "WHERE department_id < 70 "
    + "ORDER BY department_id",
      function(err, result)
      {
        if (err) { console.error(err); return; }
        console.log(result.rows);
      });
  });
```

Appendix C DB data type mapping changes

The mapping table of XML conversion data type of each DB supported by Connector is following.

Unless not specified version, all Connector versions are supported.

If there is a DB version difference, make sure it in the "Notes / Limitations" column.

C1 MySQL

Database Type	**XML Type 2018-12-31**	**Notes / Limitations**
tinyint	xs:byte	
smallint	xs:short	
mediumint	xs:int	
int	xs:int	
bigint	xs:long	* Max is limited to 2 ** 53 - 1 for now due to JavaScript limitations
tinyint unsigned	xs:unsignedByte	
smallint unsinged	xs:unsignedShort	
mediumint unsigned	xs:unsignedInt	
int unsigned	xs:unsignedInt	
bigint unsigned	xs:unsignedLong	* Max is limited to 2 ** 53 - 1 for now due to JavaScript limitations
decimal(p, s), numeric(p, s)	xs:decimal	
float, real	xs:float	
double	xs:double	
bit(n)	xs:string only 0s and 1s	
date	xs:date	
datetime	xs:dateTime	

Database Type	XML Type 2018-12-31	Notes / Limitations
timestamp	xs:dateTime	
time	xs:time	
year	xs:int	
char(n)	xs:string	
varchar(n)	xs:string	
binary	xs:base64Binary	
varbinary	xs:base64Binary	
blob	xs:base64Binary	
text	xs:string	
enum	xs:string	
set	xs:string	
spatial data types	xs:string	
json	xs:string	* Only after MySQL 5.7.8 and later
bool, boolean	xs:byte	

C2 Oracle

Database Type	XML Type 2018-12-31	Notes / Limitations
VARCHAR2(n), NVARCHAR2(n)	xs:string	
NUMBER(p, s)	xs:decimal	
FLOAT(p)	xs:decimal (2019-04-08)	
DATE	xs:date	
CHAR(n), NCHAR(n)	xs:string	
BINARY_FLOAT	xs:float	
BINARY_DOUBLE	xs:double	
CLOB, NCLOB	xs:string	
BLOB	xs:base64Binary	

Database Type	XML Type 2018-12-31	Notes / Limitations
TIMESTAMP(fractional_seconds_precision)	xs:dateTime	
INTERVAL YEAR(precision) TO MONTH	Not supported	
INTERVAL DAY(days_precision) TO SECOND(seconds_precision)	Not supported	
LONG, RAW(n), LONG RAW, ROWID, UROWID, BFILE	Not supported	

C3 PostgreSQL

Database Type	XML Type 2018-12-31	Notes / Limitations
smallint	xs:short	
integer	xs:int	
bigint	xs:long	* Max is limited to 2 ** 53 - 1 for now due to JavaScript limitations
decimal, numeric	xs:decimal	
real	xs:float	
double precision	xs:double	
money	xs:string	
character varying(n), varchar(n)	xs:string	
character(n), char(n)	xs:string	
text	xs:string	
bytea	xs:base64Binary	
bit(n) varying	xs:string only 0s and 1s	
bit(n)	xs:string only 0s and 1s	
timestamp(p) with/without tz	xs:dateTime	
date	xs:date	

Database Type	XML Type 2018-12-31	Notes / Limitations
time(p) with/without tz	xs:time	
interval(p)	xs:duration	
boolean	xs:boolean	
geometric types, point, line, lseg, box, path, polygon, circle	xs:string	
network address types, inet, cidrn, macaddr, macaddr8	xs:string	
uuid	xs:string	
xml	xs:string	
json, jsonb	xs:string	
composite types	xs:string	
array types	xs:string	
enum	xs:string	
pg_lsn, tsquery, tsvector, txid_snapshot, ...	Not supported	

C4 IBM DB2

Database Type	XML Type 2018-12-31	Notes / Limitations
BIGINT	xs:long	* Max is limited to 2 ** 53 - 1 for now due to JavaScript limitations
BLOB	xs:base64Binary	
CHAR	xs:string	
CLOB	xs:string	
DATE	xs:date	
DECFLOAT	xs:double	
DECIMAL	xs:decimal	
DOUBLE	xs:double	
INTEGER	xs:int	

Database Type	XML Type 2018-12-31	Notes / Limitations
REAL	xs:float	
SMALLINT	xs:short	
TIME	xs:time	
VARCHAR	xs:string	
XML	xs:string	
TIMESTAMP	xs:dateTime	
BINARY, VARBINARY	Not supported	
GRAPHIC, VARGRAPHIC, DBCLOB	Not supported	

C5 SQLite

Database Type	XML Type 2018-12-31	Notes / Limitations
number	xs:double	
string	xs:string	

C6 Microsoft SQL Server

Database Type	XML Type 2019-04-04	Notes / Limitations
bigint	xs:long	
bit	xs:string only 0s and 1s	
decimal(p, s)	xs:decimal	
int	xs:int	
money	xs:string	
numeric(p, s)	xs:decimal	
smallint	xs:short	
smallmoney	xs:string	

Database Type	XML Type 2019-04-04	Notes / Limitations
tinyint	xs:byte	
float	xs:float	
real	xs: float	
date	xs:date	
datetime	xs:datetime	
datetime2	xs:datetime	
datetime offset	xs:datetime	
smalldatetime	xs:datetime	
time	xs:time	
char(n)	xs:string	
varchar(n)	xs:string	
text	xs:string	
nchar(n)	xs:string	
ntext	xs:string	
nvarchar	xs:string	
binary	xs:base64Binary	
varbinary	xs:base64Binary	
xml	xs:string	
geometry	xs:string	

Revision History

Version	Date	Details
V1.6	11/02/2020	Publish first edition.