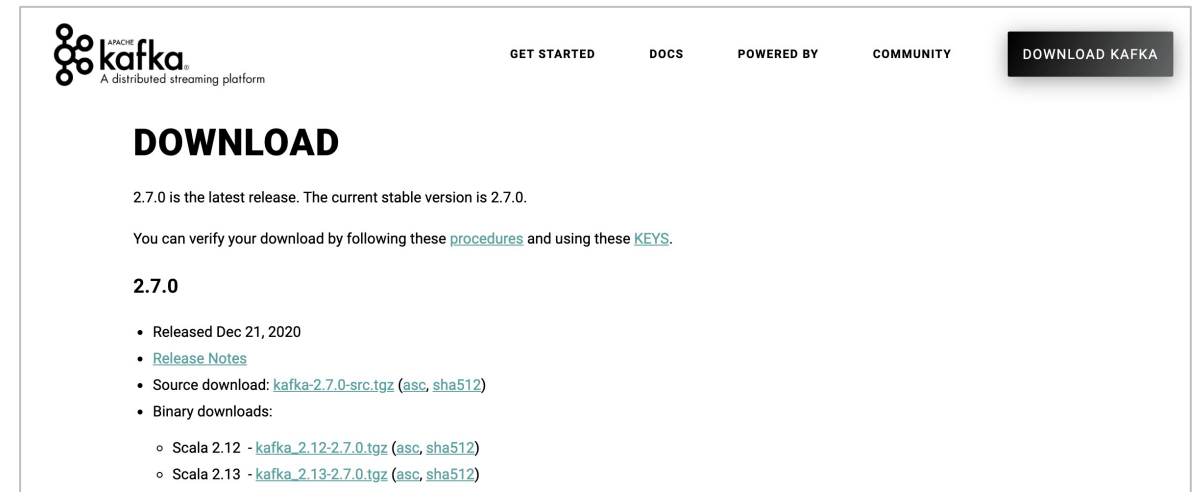
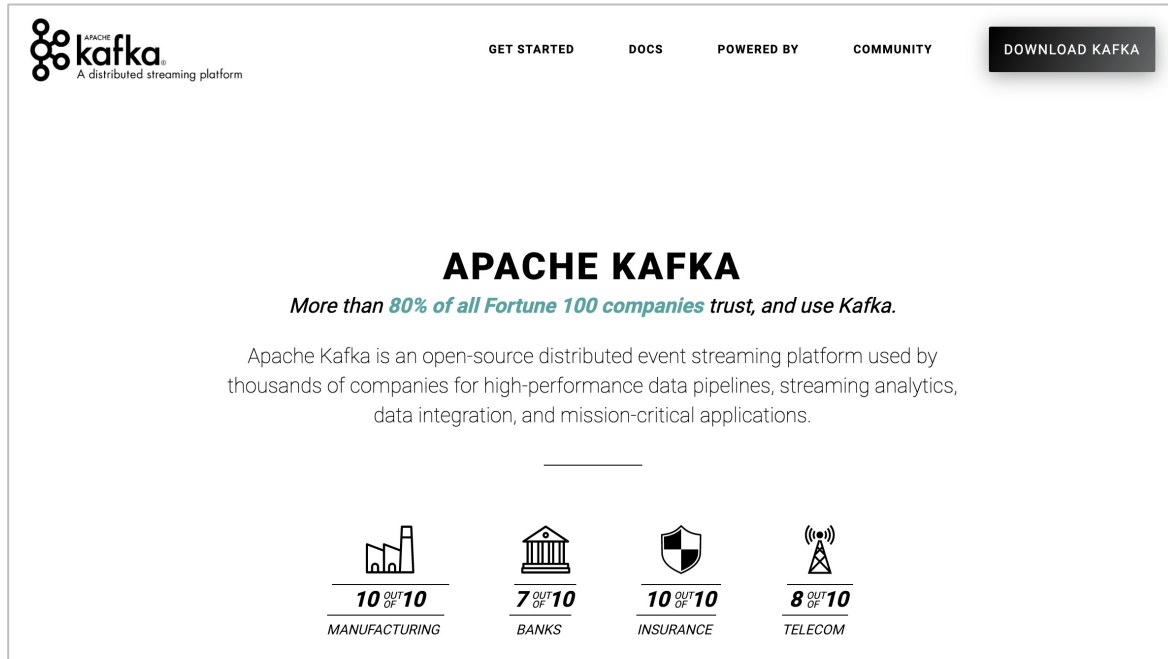


# Kafka 설치

- <http://kafka.apache.org/>



- 다운받은 kafka\_2.13-2.7.0.tgz 파일을 작업 디렉토리로 이동하고 압축 해제

# Ecosystem ① - Kafka Client

- Kafka와 데이터를 주고받기 위해 사용하는 Java Library
  - <https://mvnrepository.com/artifact/org.apache.kafka/kafka-clients>
- Producer, Consumer, Admin, Stream 등 Kafka관련 API 제공
- 다양한 3rd party library 존재: C/C++, Node.js, Python, .NET 등
  - <https://cwiki.apache.org/confluence/display/KAFKA/Clients>





# Kafka 서버 기동

- Zookeeper 및 Kafka 서버 구동

- `$KAFKA_HOME/bin/zookeeper-server-start.sh $KAFKA_HOME/config/zookeeper.properties`
- `$KAFKA_HOME/bin/kafka-server-start.sh $KAFKA_HOME/config/server.properties`

- Topic 생성

- `$KAFKA_HOME/bin/kafka-topics.sh --create --topic quickstart-events --bootstrap-server localhost:9092 \`  
`--partitions 1`

- Topic 목록 확인

- `$KAFKA_HOME/bin/kafka-topics.sh --bootstrap-server localhost:9092 --list`

- Topic 정보 확인

- `$KAFKA_HOME/bin/kafka-topics.sh --describe --topic quickstart-events --bootstrap-server localhost:9092`

# Kafka 서버 기동 - Windows

- 다운받은 kafka\_2.13-2.7.0.tgz 파일을 C:\Work\ 디렉토리로 이동, 압축 해제
  - Windows에서는 Kafka 실행 명령어는 \$KAFKA\_HOME\bin\windows 폴더에 저장되어 있음

```
[C:\Work\kafka_2.13-2.7.0]$ .\bin\windows\zookeeper-server-start.bat .\config\zookeeper.properties
[2021-02-21 11:14:07,528] INFO Reading configuration from: .\config\zookeeper.properties (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2021-02-21 11:14:07,533] WARN \tmp\zookeeper is relative. Prepend .\ to indicate that you're sure! (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2021-02-21 11:14:07,543] INFO clientPortAddress is 0.0.0.0:2181 (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2021-02-21 11:14:07,543] INFO secureClientPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
```

```
[C:\Work\kafka_2.13-2.7.0]$ .\bin\windows\kafka-server-start.bat .\config\server.properties
[2021-02-21 12:54:09,302] INFO Registered kafka:type=kafka.Log4jController MBean (kafka.utils.Log4jControllerRegistration$)
```

# Kafka Producer/Consumer 테스트

## ■ 메시지 생산

- *`$KAFKA_HOME/bin/kafka-console-producer.sh --broker-list localhost:9092 --topic quickstart-events`*

```
▶ ./bin/kafka-console-producer.sh --broker-list localhost:9092 --topic quickstart-events
>Hello, World!
>Hi, there.
>
```

## ■ 메시지 소비

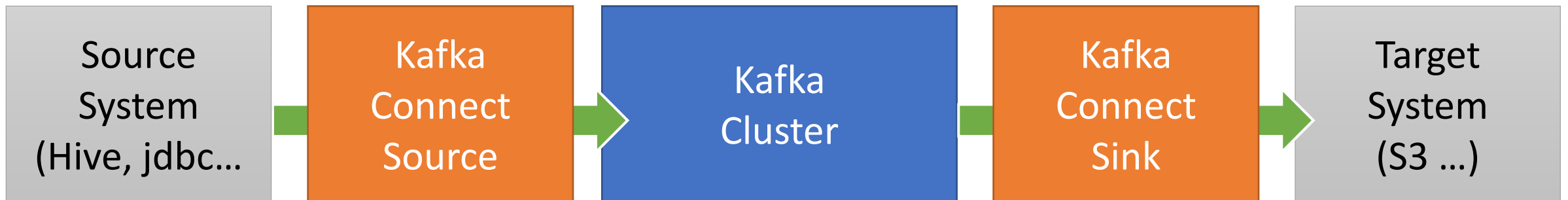
- *`$KAFKA_HOME/bin/kafka-console-consumer.sh --bootstrap-server localhost:9092 --topic quickstart-events \`  
`--from-beginning`*

```
▶ ./bin/kafka-console-consumer.sh --bootstrap-server localhost:9092 --topic quickstart-events
--from-beginning
Hello, World!
Hi, there.

```

## Ecosystem ② - Kafka Connect

- Kafka Connect를 통해 Data를 Import/Export 가능
- 코드 없이 Configuration으로 데이터를 이동
- Standalone mode, Distribution mode 지원
  - *RESTful API 통해 지원*
  - *Stream 또는 Batch 형태로 데이터 전송 가능*
  - *커스텀 Connector를 통한 다양한 Plugin 제공 (File, S3, Hive, Mysql, etc ...)*



# MariaDB 설치 - MacOS

## ■ MacOS

- 설치) `$ brew install mariadb`
- 시작, 종료, 상태확인) `$ mysql.server start, mysql.server stop, mysql.server status`
- 접속) `$ mysql -uroot`
- 데이터베이스 생성) `mysql> create database mydb;`

```
MariaDB [(none)]> create database mydb;  
Query OK, 1 row affected (0.001 sec)
```

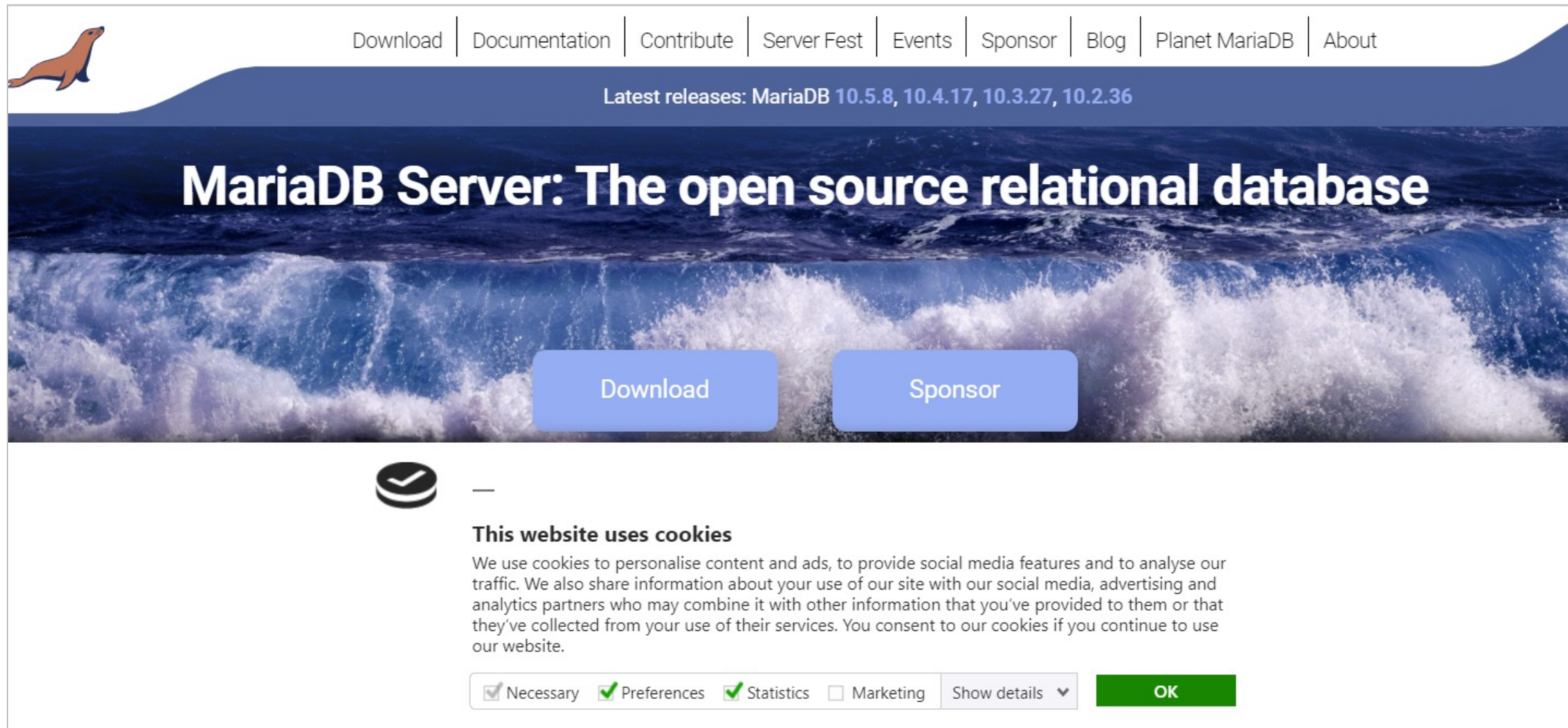
```
mysql -uroot  
ERROR 1698 (28000): Access denied for user 'root'@'localhost'
```

- Access denied 발생시)
  - `$ sudo mysql -u root`
  - `mysql> use mysql;`
  - `mysql> select user, host, plugin FROM mysql.user;`
  - `mysql> set password for 'root'@'localhost'=password('test1357');`
  - `mysql> flush privileges;`



# MariaDB 설치 - Windows

- <https://mariadb.org/>




The screenshot shows the MariaDB website homepage. At the top left is the MariaDB logo, a stylized orange seal. To its right is a navigation bar with links: Download, Documentation, Contribute, Server Fest, Events, Sponsor, Blog, Planet MariaDB, and About. Below the navigation bar is a blue banner with the text "Latest releases: MariaDB 10.5.8, 10.4.17, 10.3.27, 10.2.36". The main heading is "MariaDB Server: The open source relational database" in white text on a background of a blue ocean wave. Below the heading are two blue buttons: "Download" and "Sponsor". At the bottom of the page is a cookie consent banner. It features a circular icon with a checkmark and the text "This website uses cookies". Below this is a paragraph explaining the use of cookies. At the bottom of the banner are checkboxes for "Necessary", "Preferences", "Statistics", and "Marketing", followed by a "Show details" link and a green "OK" button.

Download | Documentation | Contribute | Server Fest | Events | Sponsor | Blog | Planet MariaDB | About

Latest releases: MariaDB 10.5.8, 10.4.17, 10.3.27, 10.2.36


## MariaDB Server: The open source relational database

Download Sponsor

 —

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☒ Necessary ☒ Preferences ☒ Statistics ☐ Marketing Show details 

OK



# MariaDB 설치 - Windows

- Package Type
  - MSI
  - **ZIP file**



The screenshot shows the MariaDB download interface with the following settings:

- MariaDB Server Version:** MariaDB Server 10.5.8
- Display older releases:** ☐
- Operating System:** Windows
- Architecture:** x86\_64
- Package Type:** ZIP file
- Download:** A blue button labeled "Download".
- Mirror:** Yongbok.net - South Korea

# MariaDB 설치 - Windows

## ■ Database 초기화

- 다운받은 ***mariadb-10.5.8-winx64.zip*** 파일을 C:\Work\ 디렉토리로 이동, 압축 해제
- 관리자 모드로 CMD를 실행 후 데이터베이스 초기화

.\bin\mariadb-install-db.exe

--datadir=C:\Work\mariadb-10.5.8-winx64\data

--service=mariaDB

--port=3306

--password=test1357 → ***root password***

```
C:\Work\mariadb-10.5.8-winx64>.bin\mariadb-install-db.exe --datadir=C:\Work\mariadb-10.5.8-winx64\data --service=mariaDB --port=3306 --password=test1357
Running bootstrap
2021-02-21 12:45:55 0 [Note] C:\Work\mariadb-10.5.8-winx64\bin\mysqld.exe (mysqld 10.5.8-MariaDB) starting as process 24056 ...
Removing default user
Setting root password
Creating my.ini file
Registering service 'mariaDB'
Creation of the database was successful

C:\Work\mariadb-10.5.8-winx64>
```

# MariaDB 설치 - Windows

## ■ Windows Service 등록 확인

서비스(로컬)					
이름	설명	상태	시작 유형	다음 사용자로 로그인	
mariaDB					
서비스 중지					
서비스 일시 중지					
서비스 다시 시작					
설명:					
MariaDB database server					
MagicLine4NX Service		실행 중	자동	Local System	
mariaDB	MariaDB dat...	실행 중	자동	Network Service	
McAfee WebAdvisor	McAfee Web...	실행 중	자동	Local System	
MessagingService_13a726	문자 메시지...		수동(트리...	Local System	
Microsoft (R) 진단 허브 표...	진단 허브 표...		수동	Local System	
Microsoft Account Sign-in ...	사용자가 Mic...		수동(트리...	Local System	
Microsoft Edge Elevation Se...	Keeps Micros...		수동	Local System	
Microsoft iSCSI Initiator Ser...	이 컴퓨터에...		수동	Local System	

# MariaDB 설치

- MariaDB Client → **Order Microservice**의 H2 Console 사용

```
<dependency>
  <groupId>org.mariadb.jdbc</groupId>
  <artifactId>mariadb-java-client</artifactId>
  <version>2.7.2</version>
</dependency>
```

**org.mariadb.jdbc.Driver**

- 테이블 생성

```
create table users (
  id          int auto_increment primary key,
  user_id     varchar(20) not null,
  pwd         varchar(20) not null,
  name        varchar(20) not null,
  created_at  datetime default NOW());
```

English ▼ Preferences Tools Help

Login

Saved Settings: Generic MySQL ▼

Setting Name: Generic MySQL Save Remove

---

Driver Class: org.mariadb.jdbc.Driver

JDBC URL: jdbc:mysql://localhost:3306/test

User Name: root

Password: .....

Connect Test Connection

Test successful

# Kafka Connect 설치 – MacOS

## ■ Kafka Connect 설치

- **`curl -O http://packages.confluent.io/archive/5.5/confluent-community-5.5.2-2.12.tar.gz`**
- **`curl -O http://packages.confluent.io/archive/6.1/confluent-community-6.1.0.tar.gz`**
- **`tar xvf confluent-community-6.1.0.tar.gz`**
- **`cd $KAFKA_CONNECT_HOME`**

## ■ Kafka Connect 설정 (기본으로 사용)

- **`$KAFKA_HOME/config/connect-distributed.properties`**

## ■ Kafka Connect 실행

- **`./bin/connect-distributed ./etc/kafka/connect-distributed.properties`**

## ■ Topic 목록 확인

- **`./bin/kafka-topics.sh --bootstrap-server localhost:9092 --list`**

```
__consumer_offsets
connect-configs
connect-offsets
connect-status
```

# JDBC Connector 설정 - MacOS

- JDBC Connector 설치

- <https://docs.confluent.io/5.5.1/connect/kafka-connect-jdbc/index.html>
  - Download and extract the ZIP file → confluentinc-kafka-connect-jdbc-10.0.1.zip 다운로드

- etc/kafka/connect-distributed.properties 파일 마지막에 아래 plugin 정보 추가

- plugin.path=[**confluentinc-kafka-connect-jdbc-10.0.1 폴더**]

```
plugin.path=/Users/dowonlee/Desktop/Work/kafka_demo/confluentinc-kafka-connect-jdbc-10.0.1/lib
```

- JdbcSourceConnector에서 MariaDB 사용하기 위해 mariadb 드라이버 복사

- ./share/java/kafka/ 폴더에 mariadb-java-client-2.7.2.jar 파일 복사





# Kafka Connect 설치 – Windows

- Kafka Connect 설치 → Windows 10에서도 curl, tar 명령어 사용 가능
  - ***curl -O <http://packages.confluent.io/archive/5.5/confluent-community-5.5.2-2.12.tar.gz>***
  - ***curl -O <http://packages.confluent.io/archive/6.1/confluent-community-6.1.0.tar.gz>***
  - ***tar xvf confluent-community-6.1.0.tar.gz***
  - ***cd \$KAFKA\_CONNECT\_HOME***
- Kafka Connect 실행
  - ***.\bin\windows\connect-distributed.bat . \etc\kafka\connect-distributed.properties***

# Kafka Connect 설치 – Windows

- 실행 시 아래와 같은 오류 발생하면, binary 파일 대신 source 파일을 다운로드 받은 것인지 확인
  - *Classpath is empty. Please build the project first e.g. by running 'gradlew jarAll'*

```
[C:\Work\confluent-6.1.0]$ .\bin\windows\connect-distributed.bat .\etc\kafka\connect-distributed.properties
Classpath is empty. Please build the project first e.g. by running 'gradlew jarAll'
```

- .\bin\windows\kafka-run-class.bat 파일에서
  - `rem Classpath addition for core` 부분을 찾아서, 그 위에 아래 코드 삽입

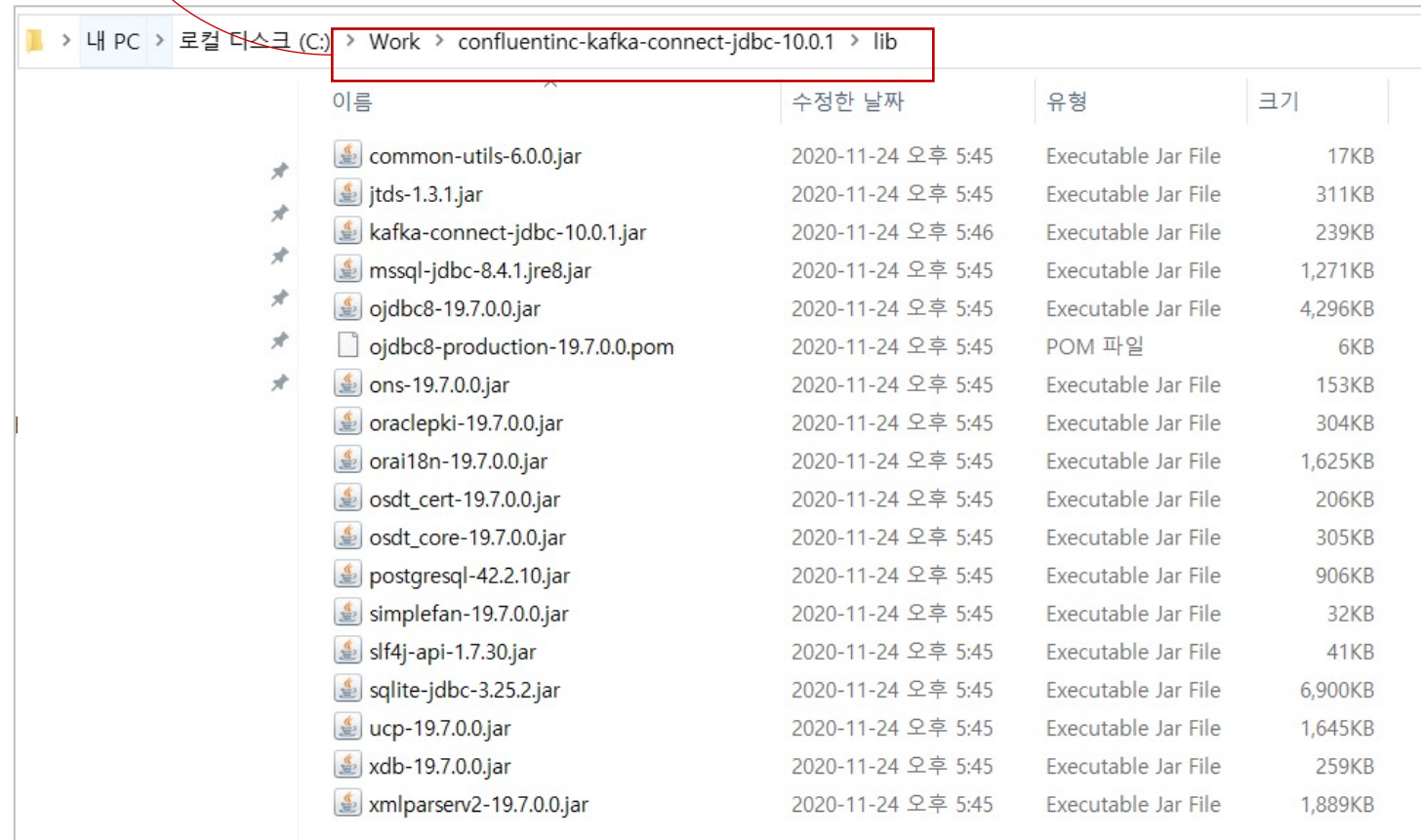
```
rem classpath addition for LSB style path
if exist %BASE_DIR%\share\java\kafka\* (
    call:concat %BASE_DIR%\share\java\kafka\*
)
```

```
97 rem classpath addition for LSB style path
98 if exist %BASE_DIR%\share\java\kafka\* (
99     call:concat %BASE_DIR%\share\java\kafka\*
100 )
101
102 rem Classpath addition for core
103 for %i in ("%BASE_DIR%\core\build\libs\kafka_%SCALA_BINARY_VERSION%.jar") do (
104     call :concat "%i"
105 )
```

# JDBC Connector 설정 - Windows

- .\etc\kafka\connect-distributed.properties 파일 마지막에 아래 plugin 정보 추가

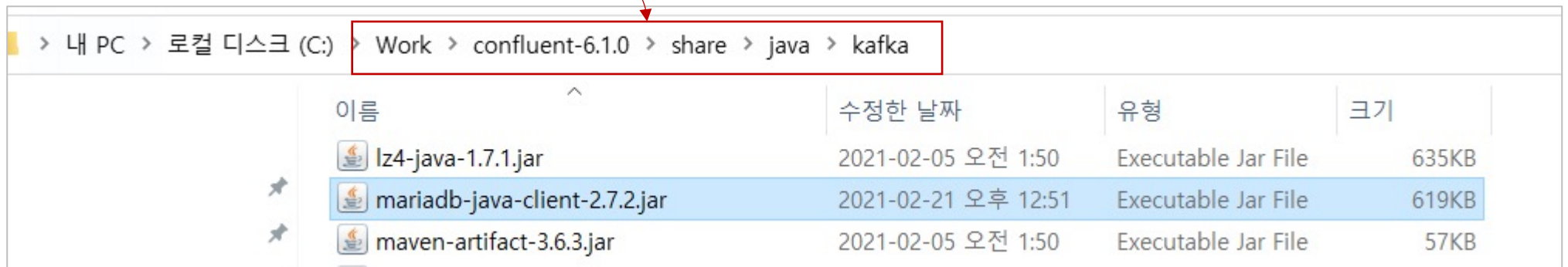
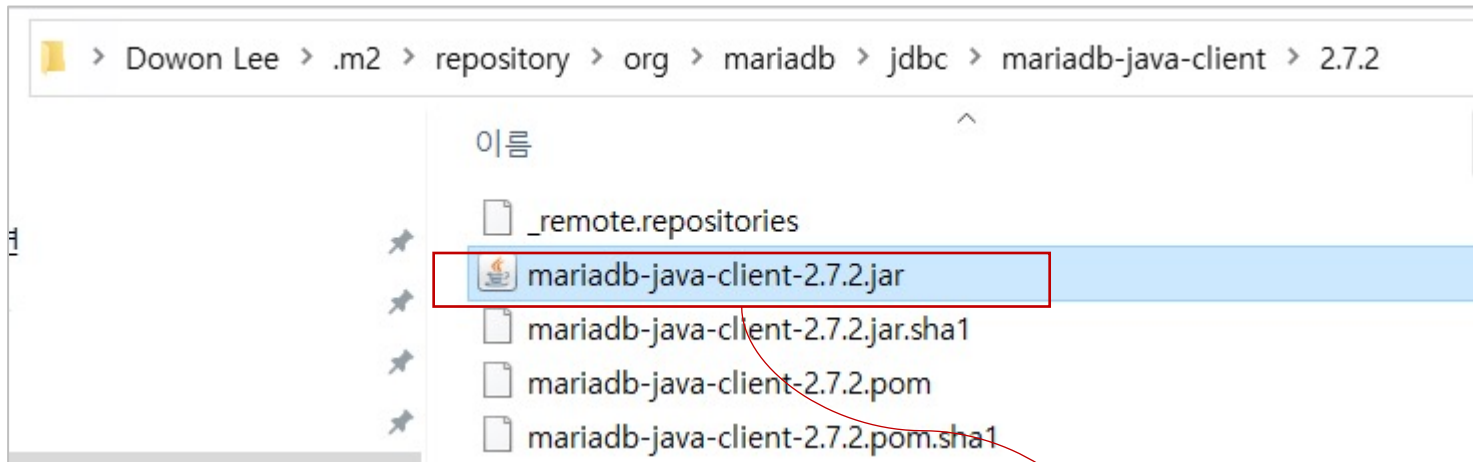
```
86 # plugin.path=/usr/share/java
87 plugin.path=C:\\Work\\confluentinc-kafka-connect-jdbc-10.0.1\\lib
```



이름	수정한 날짜	유형	크기
common-utils-6.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	17KB
jtds-1.3.1.jar	2020-11-24 오후 5:45	Executable Jar File	311KB
kafka-connect-jdbc-10.0.1.jar	2020-11-24 오후 5:46	Executable Jar File	239KB
mssql-jdbc-8.4.1.jre8.jar	2020-11-24 오후 5:45	Executable Jar File	1,271KB
ojdbc8-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	4,296KB
ojdbc8-production-19.7.0.0.pom	2020-11-24 오후 5:45	POM 파일	6KB
ons-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	153KB
oraclepki-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	304KB
orai18n-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	1,625KB
osdt_cert-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	206KB
osdt_core-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	305KB
postgresql-42.2.10.jar	2020-11-24 오후 5:45	Executable Jar File	906KB
simplefan-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	32KB
slf4j-api-1.7.30.jar	2020-11-24 오후 5:45	Executable Jar File	41KB
sqlite-jdbc-3.25.2.jar	2020-11-24 오후 5:45	Executable Jar File	6,900KB
ucp-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	1,645KB
xdb-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	259KB
xmlparserv2-19.7.0.0.jar	2020-11-24 오후 5:45	Executable Jar File	1,889KB

# JDBC Connector 설정 - Windows

- JdbcSourceConnector에서 MariaDB 사용하기 위해 mariadb 드라이버 복사
  - \${USER.HOME}\.m2 폴더에서 **mariadb-java-client-2.7.2.jar** 파일을 **./share/java/kafka/**로 복사



# Kafka Source Connect 테스트

- Kafka Source Connect 추가 (MariaDB)

```
echo '{
  "name" : "my-source-connect",
  "config" : {
    "connector.class" : "io.confluent.connect.jdbc.JdbcSourceConnector",
    "connection.url":"jdbc:mysql://localhost:3306/mydb",
    "connection.user":"root",
    "connection.password":"test1357",
    "mode": "incrementing",
    "incrementing.column.name" : "id",
    "table.whitelist":"users",
    "topic.prefix" : "my_topic_",
    "tasks.max" : "1"
  }
}' | curl -X POST -d @- http://localhost:8083/connectors --header "content-Type:application/json"
```

# Kafka Source Connect 테스트

- Kafka Connect 목록 확인
  - `curl http://localhost:8083/connectors | jq`
- Kafka Connect 확인
  - `curl http://localhost:8083/connectors/my-source-connect/status | jq`

```
{
  "name": "my-source-connect",
  "connector": {
    "state": "RUNNING",
    "worker_id": "127.0.0.1:8083"
  },
  "tasks": [
    {
      "id": 0,
      "state": "RUNNING",
      "worker_id": "127.0.0.1:8083"
    }
  ],
  "type": "source"
}
```



# Kafka Source Connect 테스트

- MariaDB에서 데이터 추가 1)

```
1 • insert into my_db.users(user_id, name) values('test2', 'TEST ADMIN');  
2  
3 • SELECT * FROM my_db.users;
```

100% 27:3

Result Grid Filter Rows: Search Edit: Export/Import:

	id	user_id	name
▶	1	test1	TEST USER
	2	test2	TEST ADMIN
	NULL	NULL	NULL

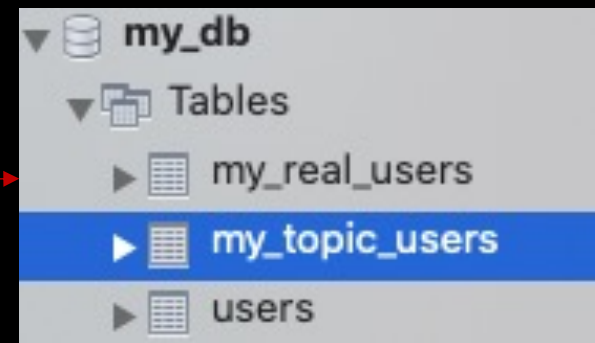
```
▶ bin/kafka-console-consumer --bootstrap-server localhost:9092 --topic my_topic_users --from-beginning  
{  
  "schema": {  
    "type": "struct",  
    "fields": [  
      {  
        "type": "int32",  
        "optional": false,  
        "field": "id"  
      },  
      {  
        "type": "string",  
        "optional": true,  
        "field": "user_id"  
      },  
      {  
        "type": "string",  
        "optional": true,  
        "field": "name"  
      }  
    ],  
    "optional": false,  
    "name": "users",  
    "payload": {  
      "id": 1,  
      "user_id": "test1",  
      "name": "TEST USER"  
    }  
  },  
  "schema": {  
    "type": "struct",  
    "fields": [  
      {  
        "type": "int32",  
        "optional": false,  
        "field": "id"  
      },  
      {  
        "type": "string",  
        "optional": true,  
        "field": "user_id"  
      },  
      {  
        "type": "string",  
        "optional": true,  
        "field": "name"  
      }  
    ],  
    "optional": false,  
    "name": "users",  
    "payload": {  
      "id": 2,  
      "user_id": "test2",  
      "name": "TEST ADMIN"  
    }  
  }  
}
```

# Kafka Sink Connect 테스트

## ■ Kafka Sink Connect 추가 (MariaDB)

```
echo '{
  "name": "my-sink-connect",
  "config": {
    "connector.class": "io.confluent.connect.jdbc.JdbcSinkConnector",
    "connection.url": "jdbc:mysql://localhost:3306/my_db",
    "connection.user": "root",
    "connection.password": "test1357",
    "auto.create": "true",
    "auto.evolve": "true",
    "delete.enabled": "false",
    "tasks.max": "1",
    "topics": "my_topic_users"
  }
}' | curl -X POST -d @- http://localhost:8083/connectors --header "content-Type:application/json"
```

Topic의 이름과 같은 테이블 생성



# Kafka Sink Connect 테스트

- MariaDB에서 데이터 추가 2)

```
1 • insert into my_db.users(user_id, name) values('test3', 'TEST MANAGER');
2 • SELECT * FROM my_db.users;
```

100% 27:2

Result Grid Filter Rows: Search Edit: Export/Import

id	user_id	name
1	test1	TEST USER
2	test2	TEST ADMIN
3	test3	TEST MANAGER
NULL	NULL	NULL

```
1 • SELECT * FROM my_db.my_topic_users;
```

100% 36:1

Result Grid Filter Rows: Search Exp

id	user_id	name
1	test1	TEST USER
2	test2	TEST ADMIN
3	test3	TEST MANAGER

```
bin/kafka-console-consumer --bootstrap-server localhost:9092 --topic my_
{"schema":{"type":"struct","fields":[{"type":"int32","optional":false,"field":
e,"field":"user_id"}, {"type":"string","optional":true,"field":"name"}], "op
"id":1,"user_id":"test1","name":"TEST USER"}}
{"schema":{"type":"struct","fields":[{"type":"int32","optional":false,"field":
e,"field":"user_id"}, {"type":"string","optional":true,"field":"name"}], "op
e,"field":"user_id"}, {"type":"string","optional":true,"field":"name"}], "optional":false,"name":"users"},"payload":{"
"id":2,"user_id":"test2","name":"TEST ADMIN"}}
{"schema":{"type":"struct","fields":[{"type":"int32","optional":false,"field":
e,"field":"user_id"}, {"type":"string","optional":true,"field":"name"}], "optional":false,"name":"users"},"payload":{"
"id":3,"user_id":"test3","name":"TEST MANAGER"}}}
```

# Kafka Sink Connect 테스트

- Kafka Producer를 이용해서 Kafka Topic에 데이터 직접 전송
  - Kafka-console-producer에서 데이터 전송 → Topic에 추가 → MariaDB에 추가

```
▶ ./bin/kafka-console-producer.sh --broker-list localhost:9092 --topic my_topic_users  
>{"schema":{"type":"struct","fields":[{"type":"int32","optional":false,"field":"id"}, {"type":"string","optional":true,"field":"user_id"}, {"type":"string","optional":true,"field":"name"}, {"type":"string","optional":true,"field":"pwd"}, {"type":"int64","optional":true,"name":"org.apache.kafka.connect.data.Timestamp","version":1,"field":"createAt"}],"optional":false,"name":"users"},"payload":{"id":4,"user_id":"user4","name":"User4","pwd":"test4444","createAt":1613877255000}}
```

```
{  
  "schema": {  
    "type": "struct",  
    "fields": [  
      {"type": "int32", "optional": false, "field": "id"},  
      {"type": "string", "optional": true, "field": "user_id"},  
      {"type": "string", "optional": true, "field": "name"}  
    ],  
    "optional": false,  
    "name": "users3"  
  },  
  "payload": {  
    "id": 3,  
    "user_id": "aaa5",  
    "name": "aaa6"  
  }  
}
```

SELECT \* FROM MY\_USERS;

id	user_id	name	pwd	createAt
1	user3	User3	test3333	2021-02-21 03:21:49.0
4	user54	User4	test5555	2021-02-21 03:14:15.0

(2 rows, 0 ms)