Apache Flink

TensorFlow与Apache Flink 的结合与实践

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Apache Flink

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PART 01

Background

Background

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TensorFlow is an open source software library for numerical computation using data flow graphs and is the most popular **AI computing framework**.

Flink is a framework and distributed processing engine for stateful computations over unbounded and bounded data streams。**Flink is widely used in data processing and Feature Engineering**

Machine learning workflow

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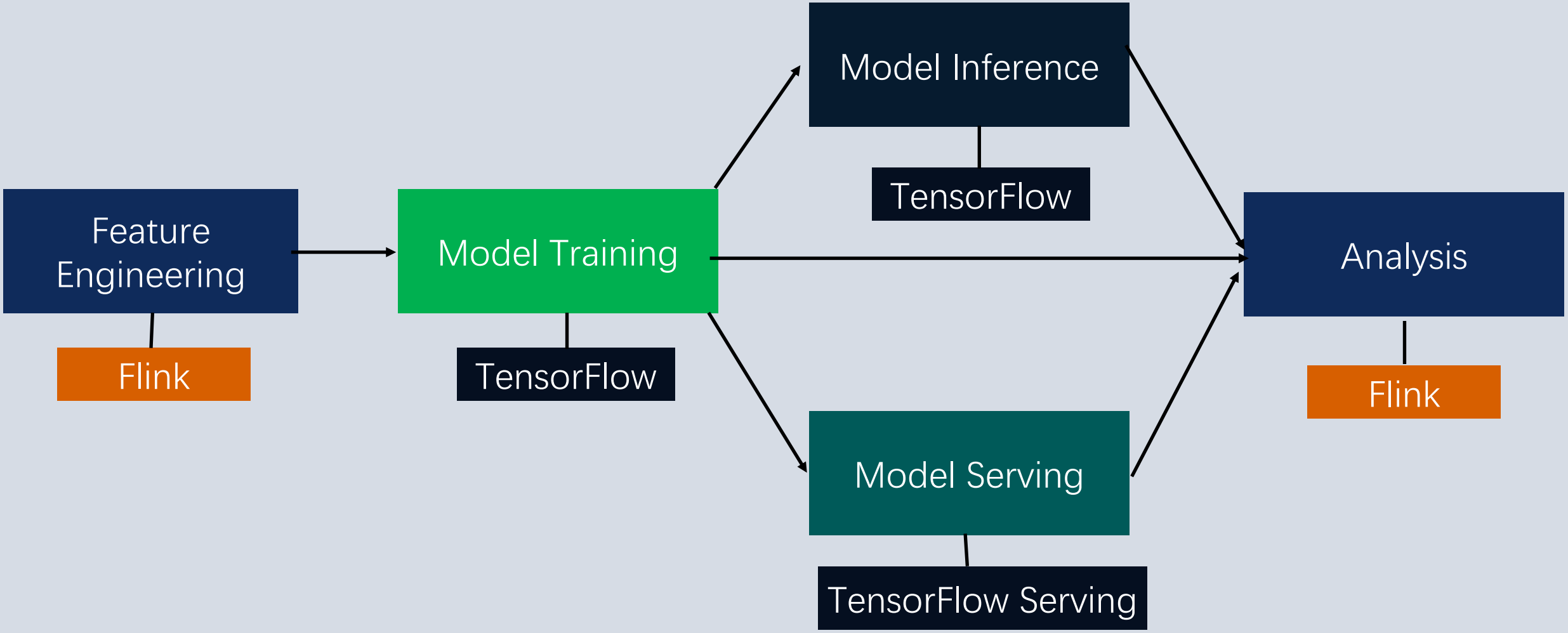

Problems

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- *Users do feature engineering, model training and model prediction with **two framework**.*
- *Distributed programs often run in clusters but **it's not friendly** to use TensorFlow for distributed training to determine IP and port first.*
- *TensorFlow Distributed Running Can't **Failover Automatically**。*

Goal

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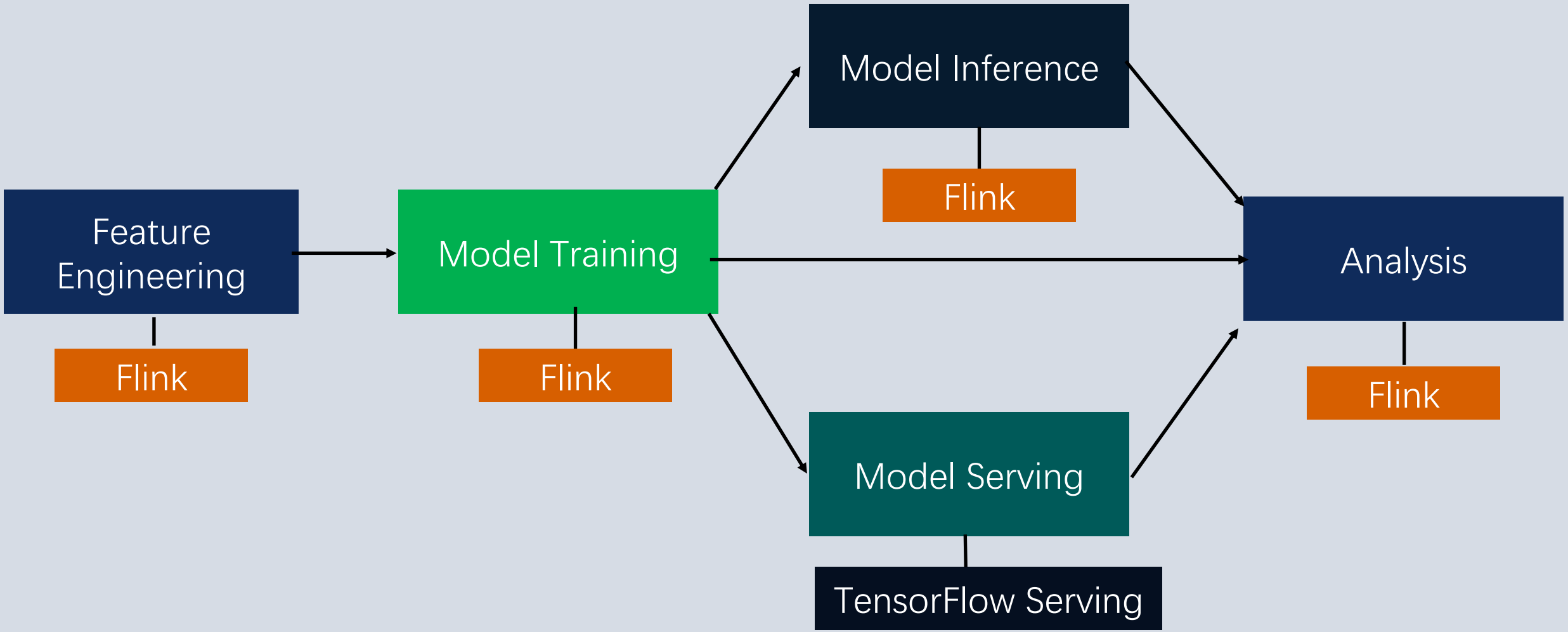

PART 02

Machine Learning On Flink

Flink

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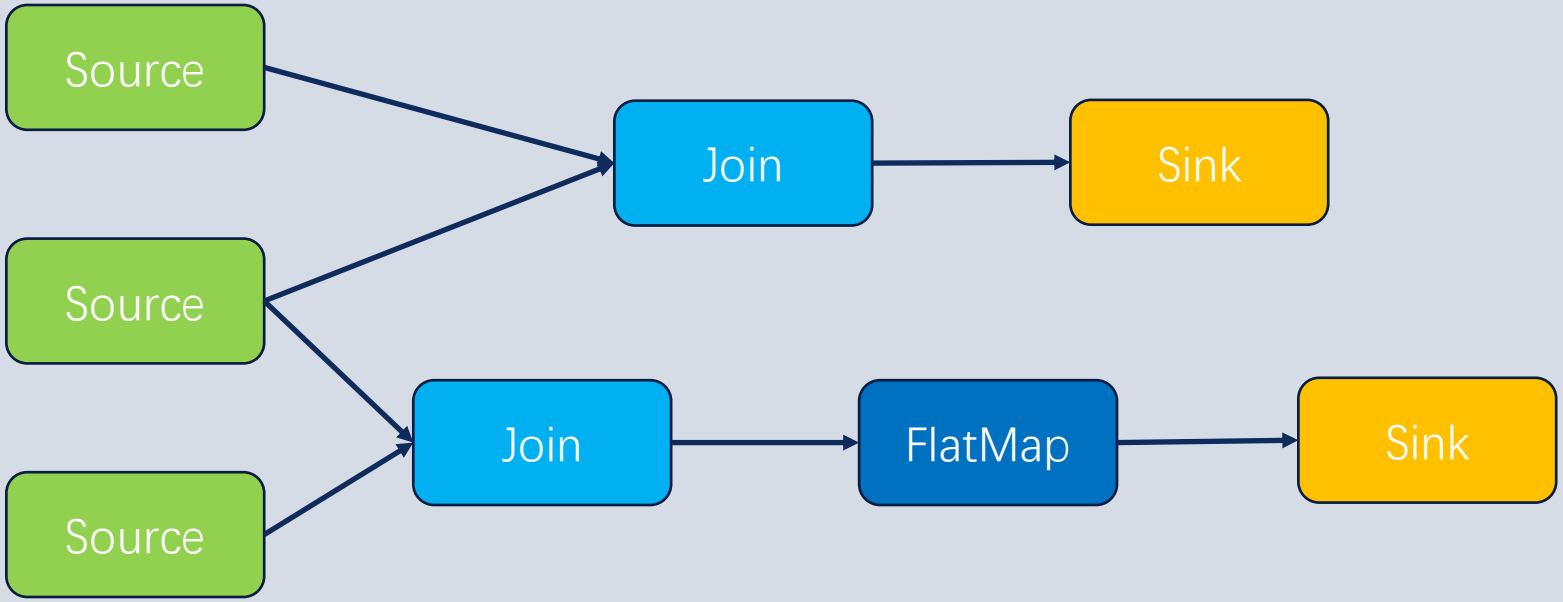
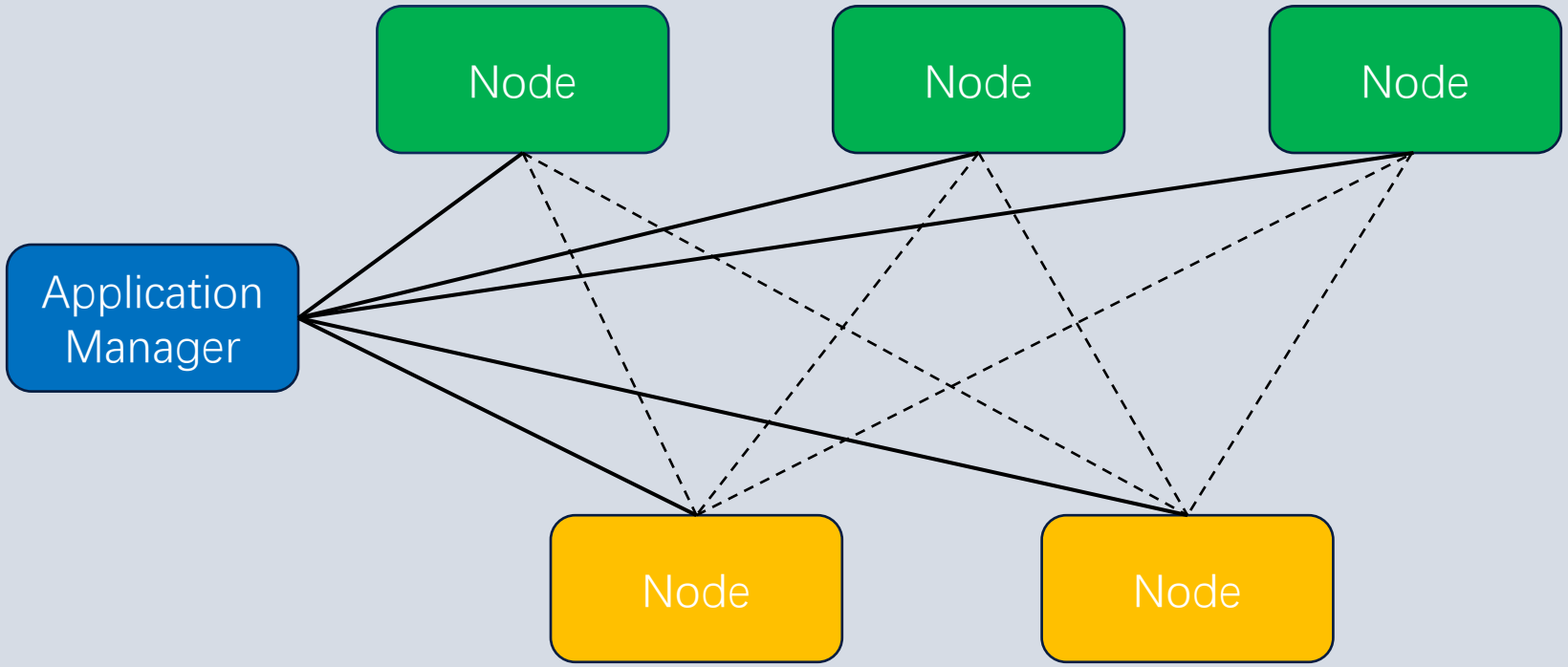


Machine learning cluster



Machine Learning On Flink

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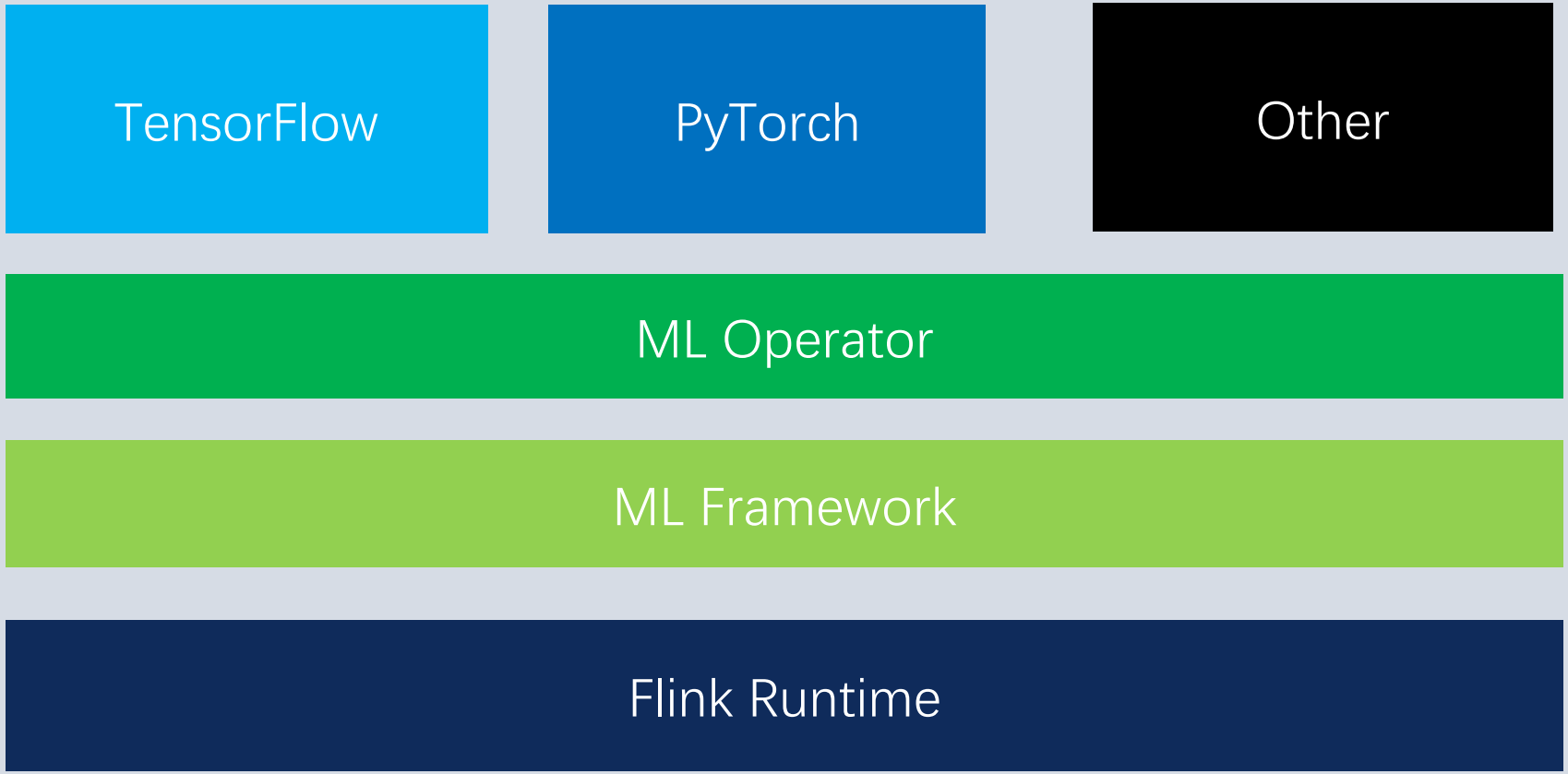

ML Framework

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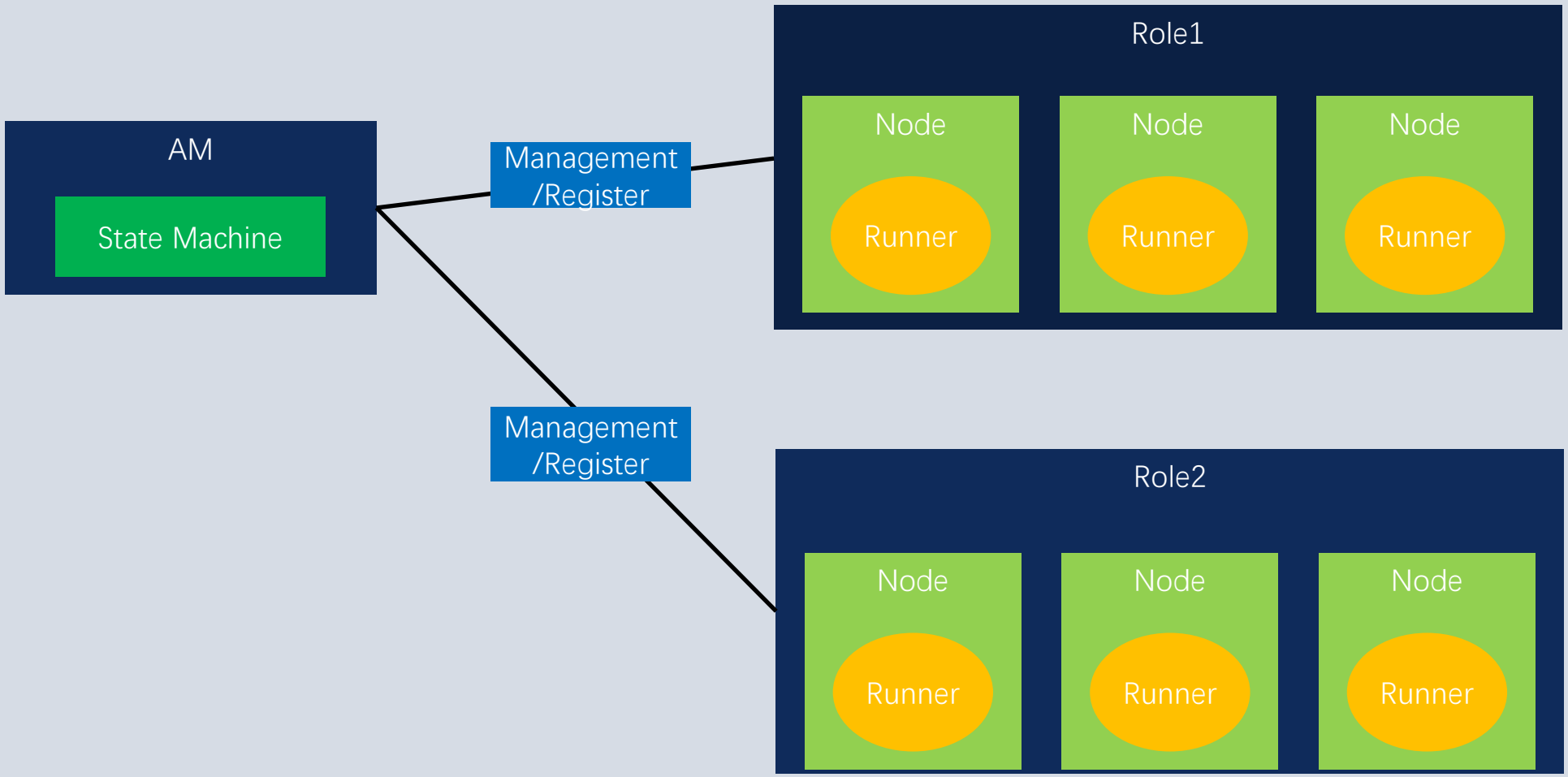

ML Operator

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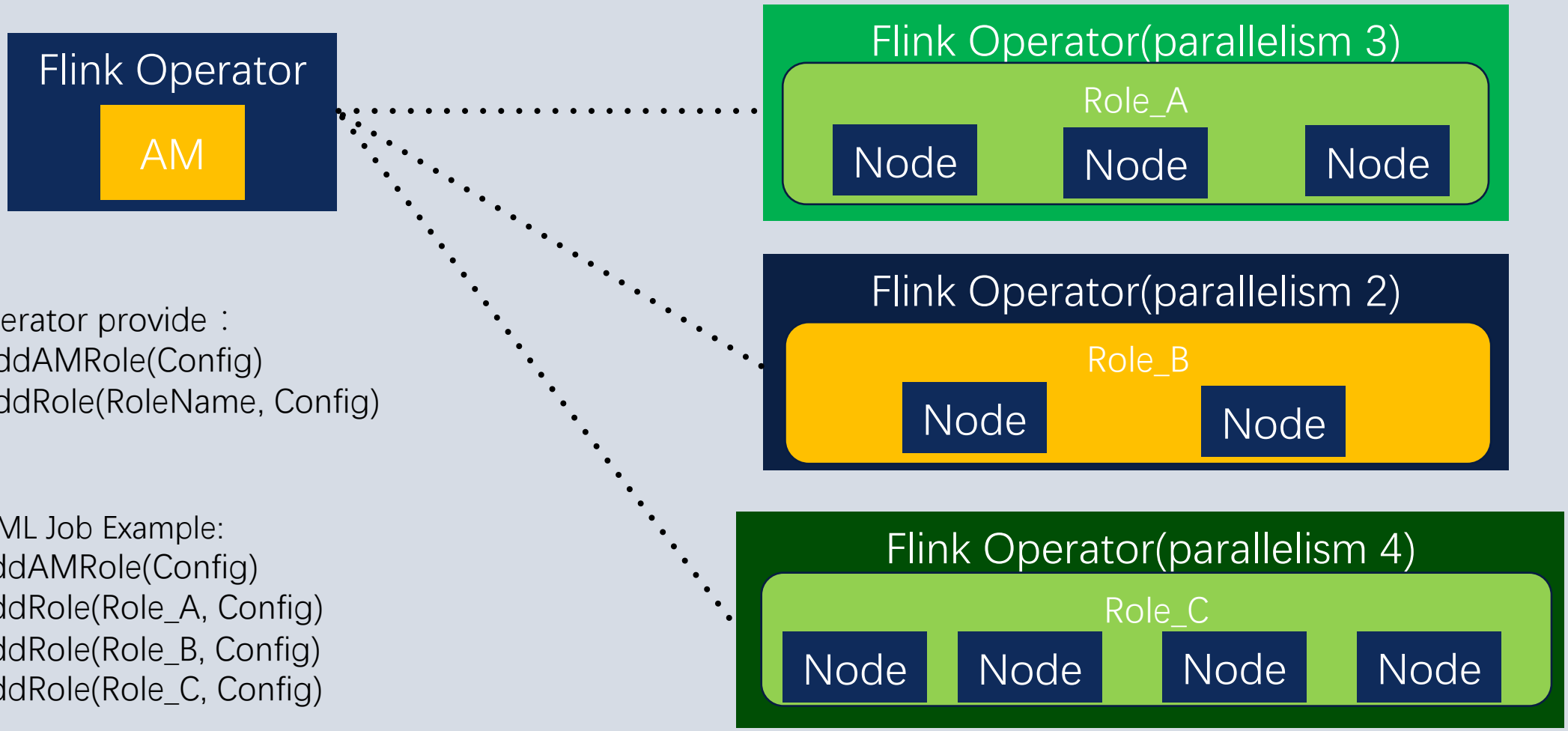

ML Operator provide：

1. addAMRole(Config)
2. addRole(RoleName, Config)

Create ML Job Example:

1. addAMRole(Config)
2. addRole(Role_A, Config)
3. addRole(Role_B, Config)
4. addRole(Role_C, Config)

Batch Mode

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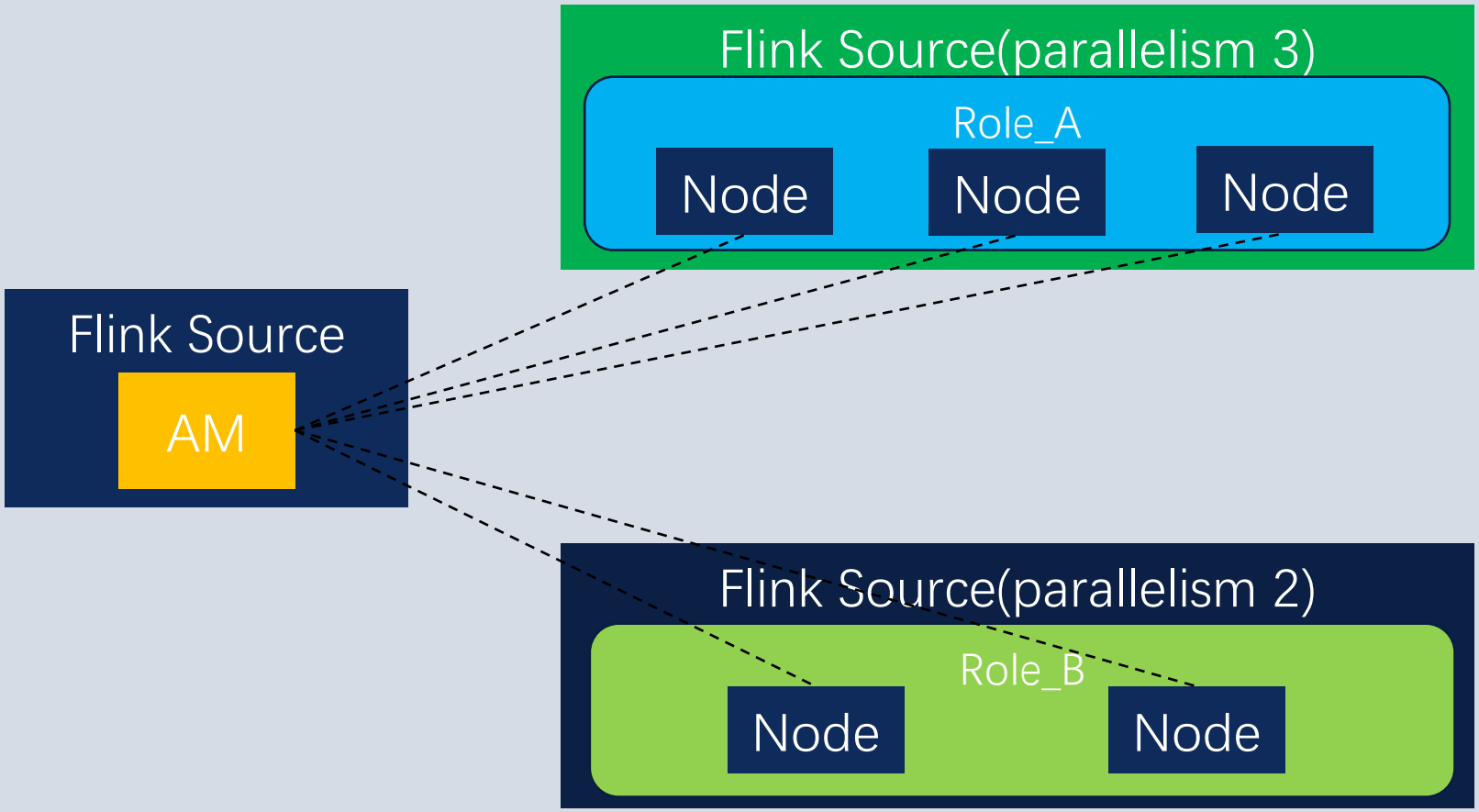

Do not read data from flink， plan role as flink source operator

Stream Mode

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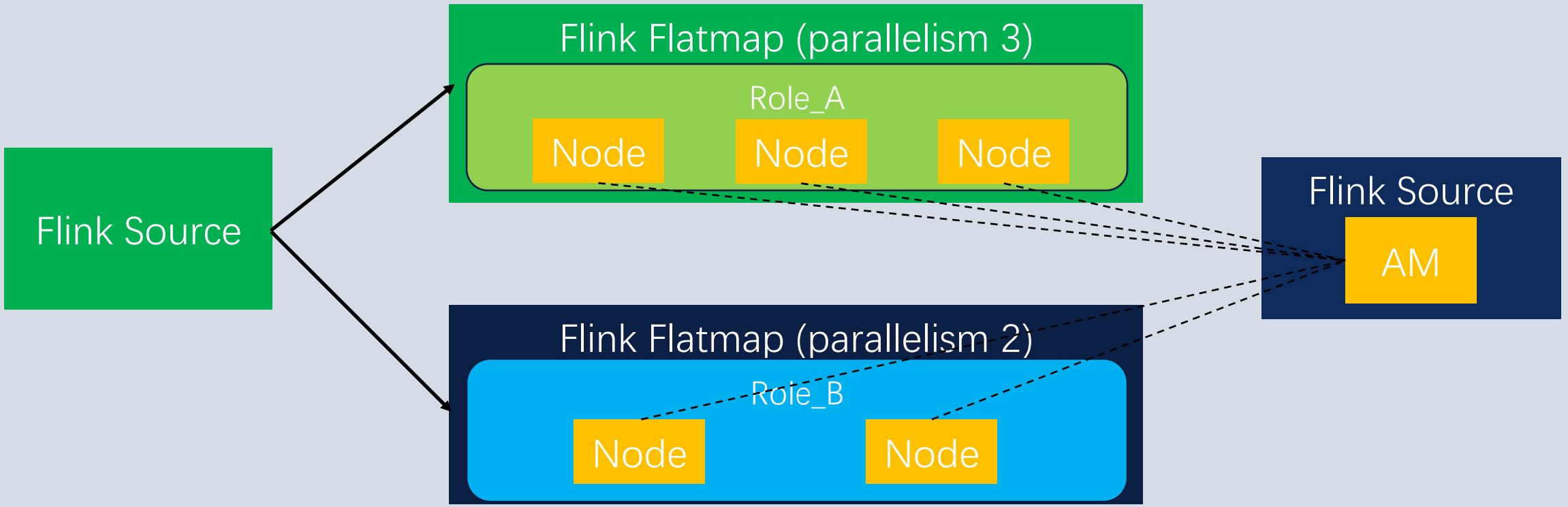

Read data from flink ， plan role as flink flatmap operator

Data Exchange

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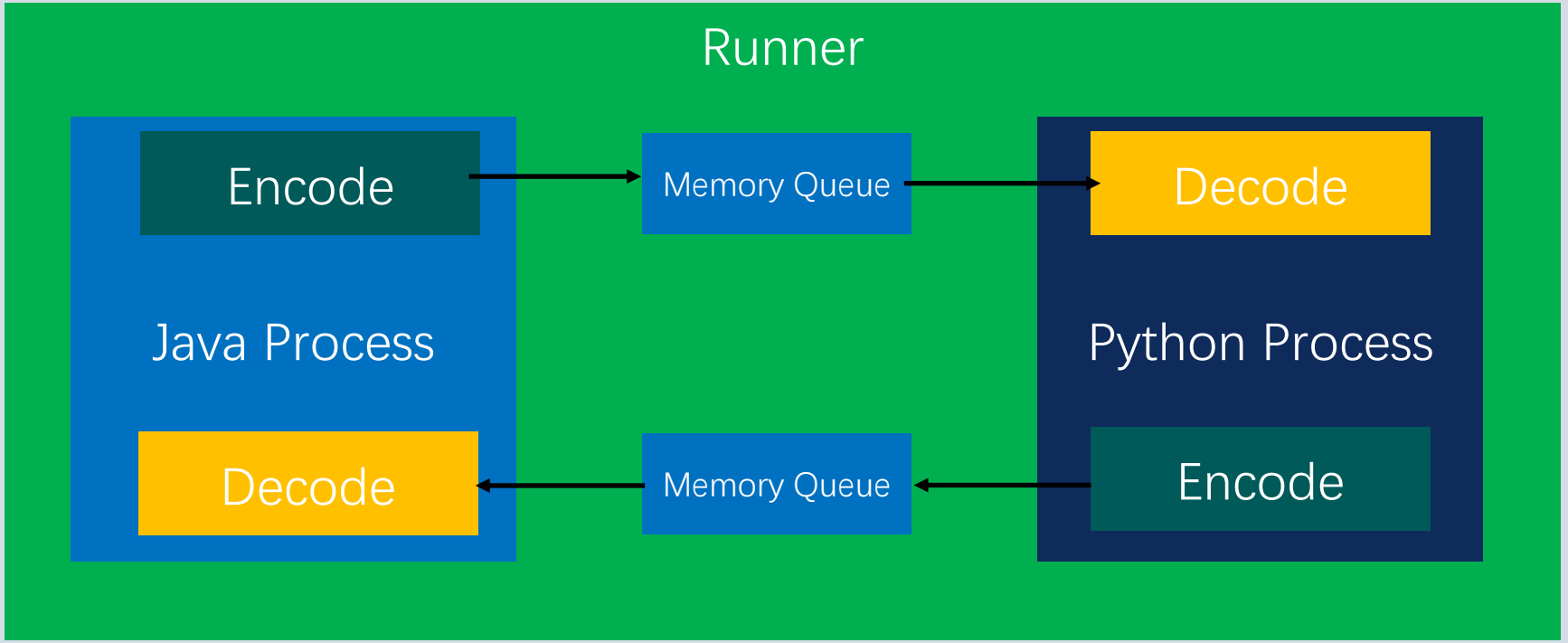

1. Encode transfer user define object to byte[]
2. Decode transfer byte[] to user define object

Encode and Decode is extensible

Summary

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1. Cluster creation and state management

2. Java and python data exchange

PART 03

TensorFlow

TensorFlow Training

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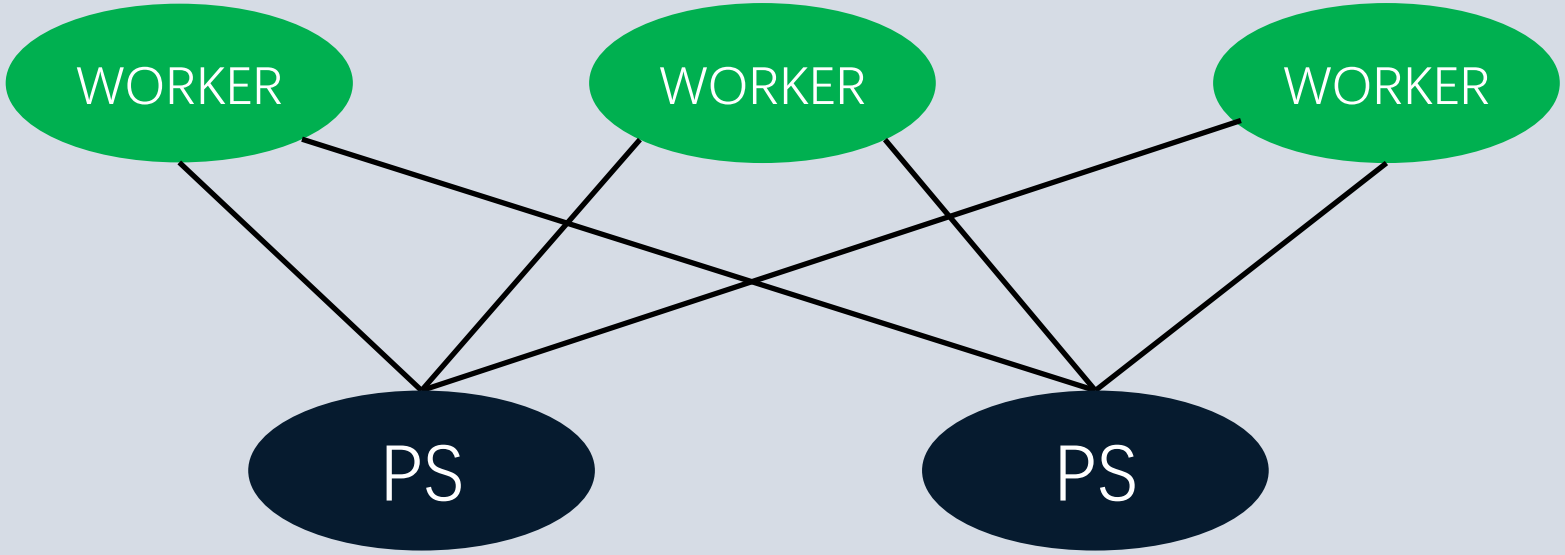

TensorFlow Batch Training

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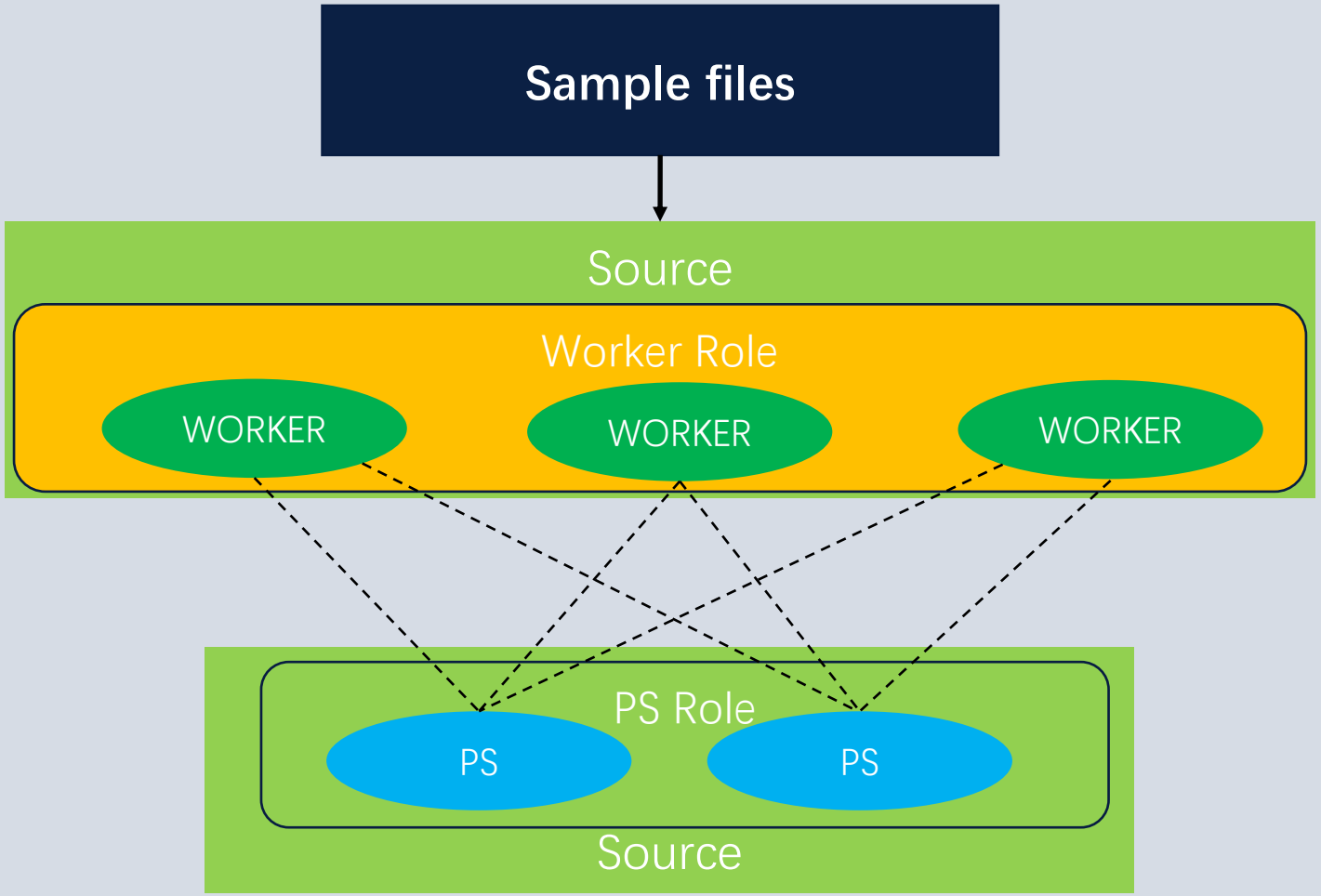

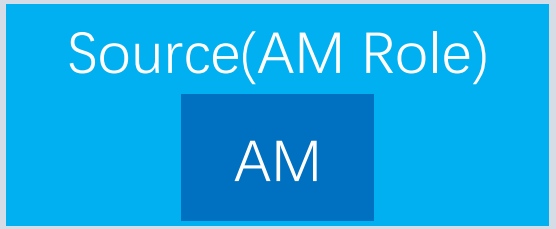

TensorFlow Stream Training

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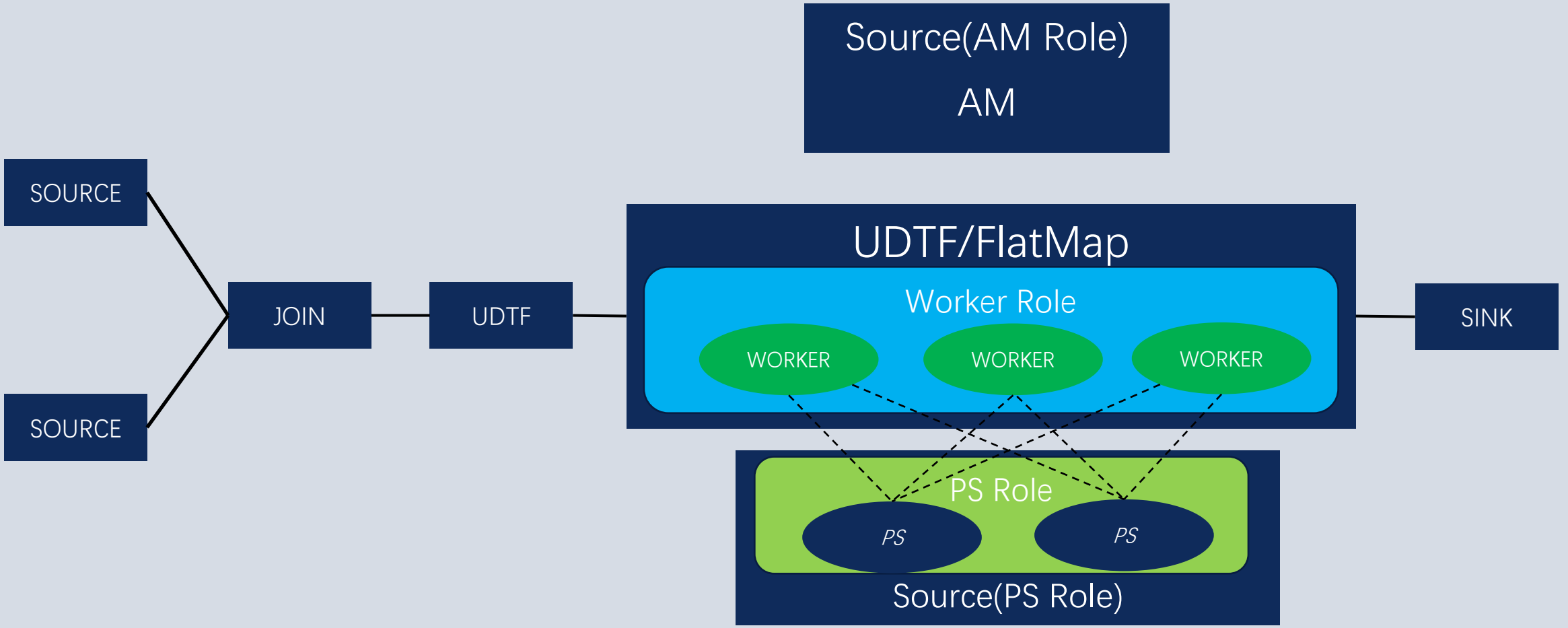

TensorFlow Stream Inference

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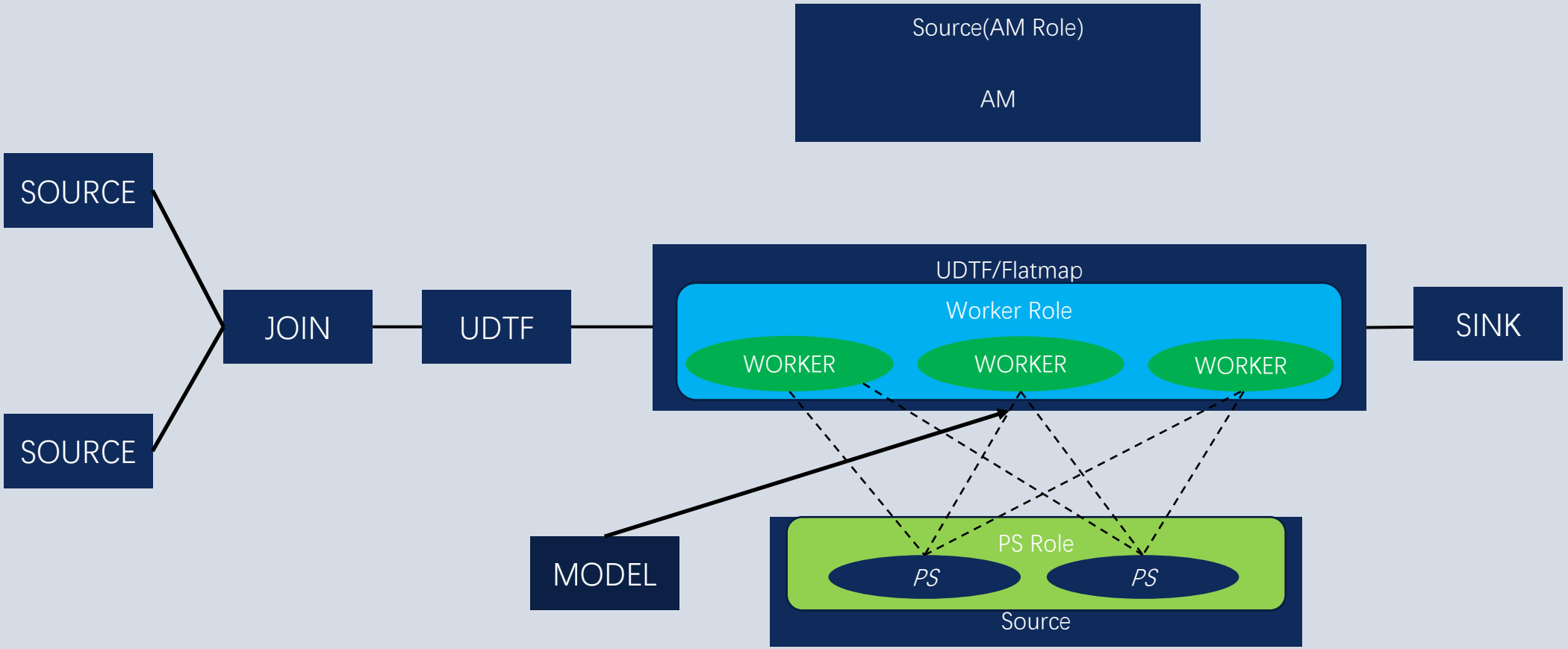
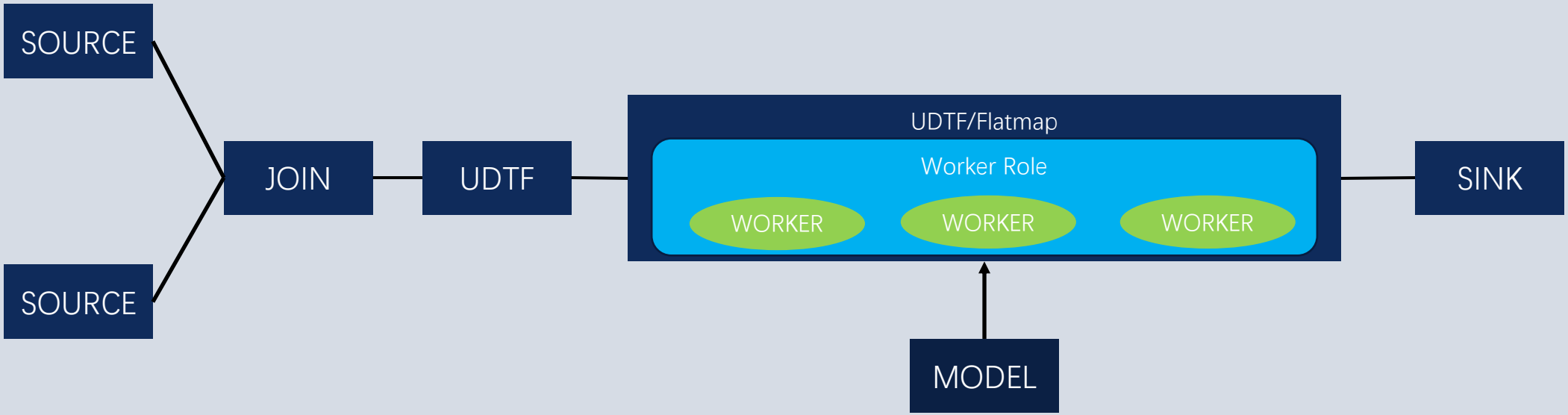


TensorFlow Stream Inference

Apache Flink



TensorFlow Example

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```
import tensorflow as tf
cluster = tf.train.ClusterSpec({
    "worker": [
        "A_IP:2222",
        "B_IP:1234",
        "C_IP:2222"
    ],
    "ps": [
        "D_IP:2222",
    ]})
isps = False
if isps:
    server = tf.train.Server(cluster, job_name='ps', task_index=0)
    server.join()
else:
    server = tf.train.Server(cluster, job_name='worker', task_index=0)
    with tf.device(tf.train.replica_device_setter(worker_device='/job:worker/task:0', cluster=cluster)):
        w = tf.get_variable('w', (2, 2), tf.float32, initializer=tf.constant_initializer(2))
        b = tf.get_variable('b', (2, 2), tf.float32, initializer=tf.constant_initializer(5))
        addwb = w + b
        mutwb = w * b
        divwb = w / b
```

TensorFlow Example

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```
import tensorflow as tf
from flink_ml_tensorflow.tensorflow_context import TFContext

def run_main(context):
    tf_context = TFContext(context)
    cluster = tf_context .get_cluster()
    job_name = tf_context .get_job_name()
    task_index = tf_context .get_task_index()
    if 'ps' == job_name:
        server = tf.train.Server(cluster, job_name=job_name, task_index=task_index)
        server.join()
    else:
        server = tf.train.Server(cluster, job_name=job_name, task_index=task_index)
        with tf.device(tf.train.replica_device_setter(worker_device='/job:worker/task:0', cluster=cluster)):
            w = tf.get_variable('w', (2, 2), tf.float32, initializer=tf.constant_initializer(2))
            b = tf.get_variable('b', (2, 2), tf.float32, initializer=tf.constant_initializer(5))
            addwb = w + b
            mutwb = w * b
            divwb = w / b

if __name__ == "__main__":
    stream_env = StreamExecutionEnvironment.get_execution_environment()
    train(3, 1, run_main, properties=None, stream_env=stream_env, input_ds=None, output_row_type=None)
```

TensorFlow Failover

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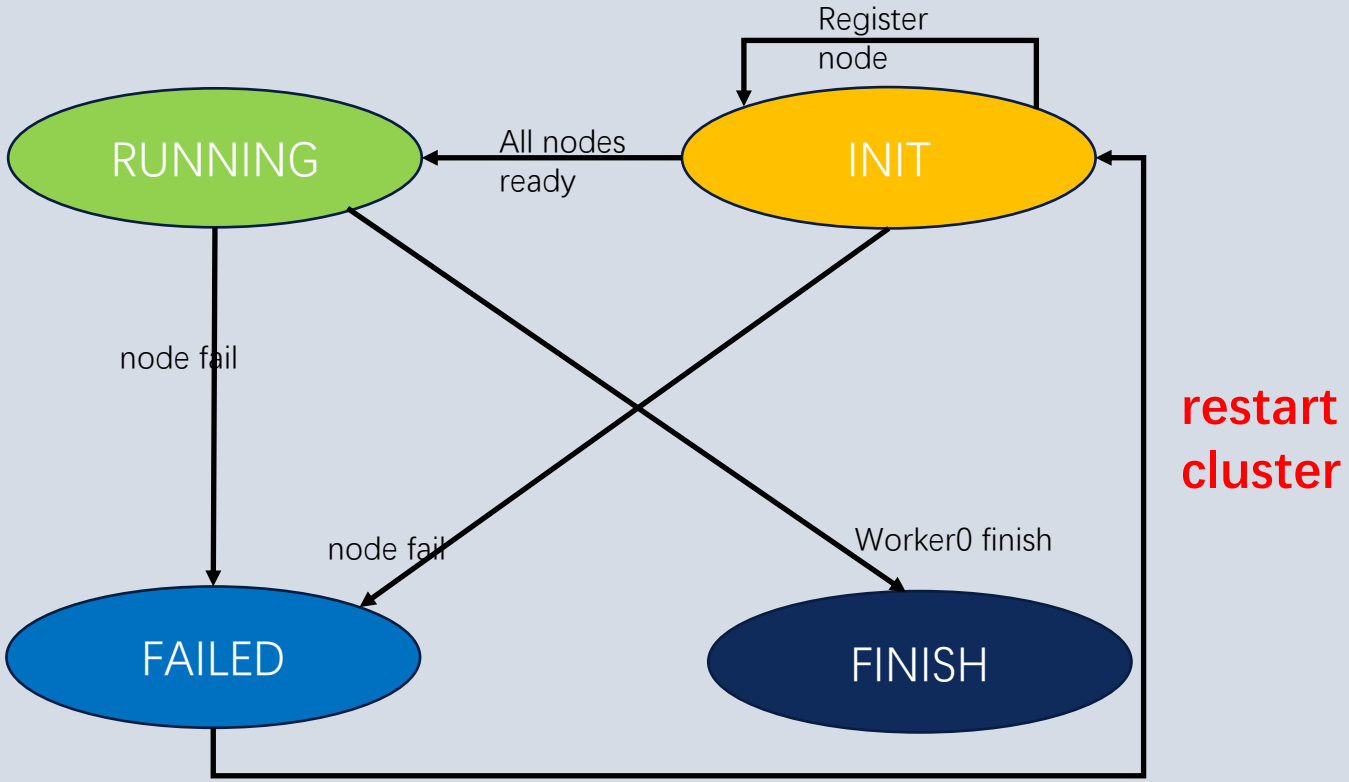

TensorFlow Applications

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1. Search Ranking
2. Recommender System

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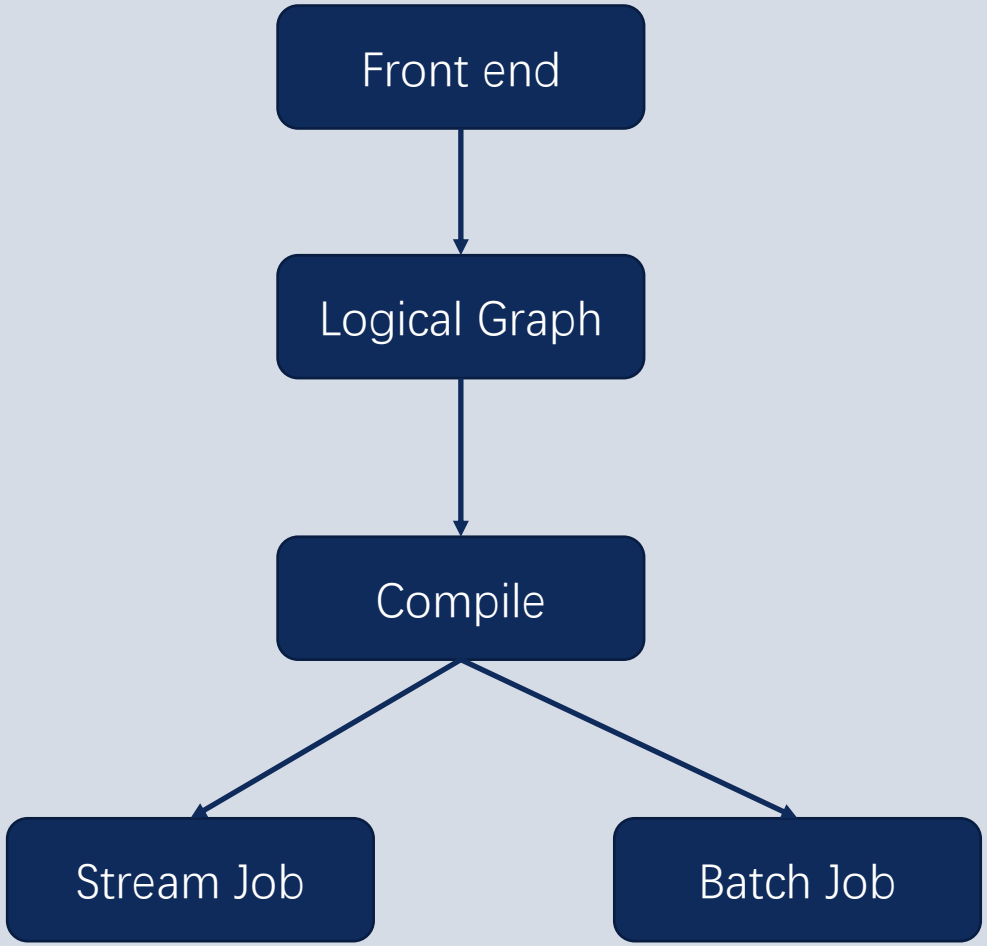
PART 04

Future

F u t u r e



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https://github.com/alibaba/flink-ai-extended

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Flink Forward Asia

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Official website

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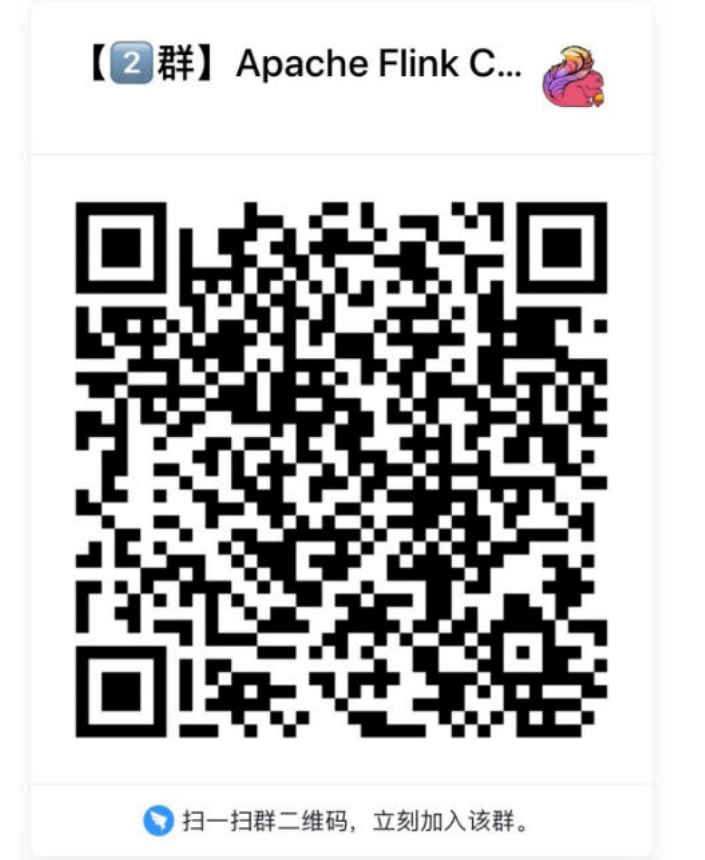
Apache Flink 社区微信公众号「 Ververica」

Meetup动态 / Release 发布信息 / Flink 应用实践



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THANKS

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· SHANGHAI