

```
!pip install tf-agents[reverb]
```

```
Looking in indexes: https://pypi.org/simple, https://us-python.pkg.dev/colab-w
Requirement already satisfied: tf-agents[reverb] in /usr/local/lib/python3.9/c
Requirement already satisfied: gym<0.23.0,>=0.17.0 in /usr/local/lib/python3.
Requirement already satisfied: absl-py>=0.6.1 in /usr/local/lib/python3.9/dist
Requirement already satisfied: pygame==2.1.3 in /usr/local/lib/python3.9/dist
Requirement already satisfied: tensorflow-probability~=0.19.0 in /usr/local/li
Requirement already satisfied: cloudpickle>=1.3 in /usr/local/lib/python3.9/di
Requirement already satisfied: six>=1.10.0 in /usr/local/lib/python3.9/dist-pa
Requirement already satisfied: wrapt>=1.11.1 in /usr/local/lib/python3.9/dist-
Requirement already satisfied: typing-extensions>=3.7.4.3 in /usr/local/lib/py
Requirement already satisfied: gin-config>=0.4.0 in /usr/local/lib/python3.9/c
Requirement already satisfied: numpy>=1.19.0 in /usr/local/lib/python3.9/dist-
Requirement already satisfied: pillow in /usr/local/lib/python3.9/dist-package
Requirement already satisfied: protobuf>=3.11.3 in /usr/local/lib/python3.9/di
Requirement already satisfied: rlds in /usr/local/lib/python3.9/dist-packages
Requirement already satisfied: dm-reverb~=0.11.0 in /usr/local/lib/python3.9/c
Requirement already satisfied: tensorflow~=2.12.0 in /usr/local/lib/python3.9/
Requirement already satisfied: portpicker in /usr/local/lib/python3.9/dist-pac
Requirement already satisfied: dm-tree in /usr/local/lib/python3.9/dist-packag
Requirement already satisfied: importlib-metadata>=4.10.0 in /usr/local/lib/py
Requirement already satisfied: gym-notices>=0.0.4 in /usr/local/lib/python3.9/
Requirement already satisfied: tensorboard<2.13,>=2.12 in /usr/local/lib/pythc
Requirement already satisfied: libclang>=13.0.0 in /usr/local/lib/python3.9/di
Requirement already satisfied: jax>=0.3.15 in /usr/local/lib/python3.9/dist-pa
Requirement already satisfied: opt-einsum>=2.3.2 in /usr/local/lib/python3.9/c
Requirement already satisfied: gast<=0.4.0,>=0.2.1 in /usr/local/lib/python3.9
Requirement already satisfied: setuptools in /usr/local/lib/python3.9/dist-pac
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in /usr/lc
Requirement already satisfied: h5py>=2.9.0 in /usr/local/lib/python3.9/dist-pa
Requirement already satisfied: google-pasta>=0.1.1 in /usr/local/lib/python3.9
Requirement already satisfied: termcolor>=1.1.0 in /usr/local/lib/python3.9/di
Requirement already satisfied: packaging in /usr/local/lib/python3.9/dist-pack
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /usr/local/lib/python3.9
Requirement already satisfied: keras<2.13,>=2.12.0 in /usr/local/lib/python3.9
Requirement already satisfied: tensorflow-estimator<2.13,>=2.12.0 in /usr/loc
Requirement already satisfied: flatbuffers>=2.0 in /usr/local/lib/python3.9/di
Requirement already satisfied: astunparse>=1.6.0 in /usr/local/lib/python3.9/c
Requirement already satisfied: decorator in /usr/local/lib/python3.9/dist-pack
Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/local/lib/python3.9/
Requirement already satisfied: zipp>=0.5 in /usr/local/lib/python3.9/dist-pack
Requirement already satisfied: scipy>=1.5 in /usr/local/lib/python3.9/dist-pac
Requirement already satisfied: google-auth<3,>=1.6.3 in /usr/local/lib/python3
Requirement already satisfied: requests<3,>=2.21.0 in /usr/local/lib/python3.9
Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in /usr/local/li
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /usr/l
Requirement already satisfied: markdown>=2.6.8 in /usr/local/lib/python3.9/dis
Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in /usr/local/
Requirement already satisfied: werkzeug>=1.0.1 in /usr/local/lib/python3.9/dis
Requirement already satisfied: pyasn1-modules>=0.2.1 in /usr/local/lib/python3
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.9/dist-
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/pythor
Requirement already satisfied: requests-oauthlib>=0.7.0 in /usr/local/lib/pyth
```



```
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /usr/local/lib/python3.9/
Requirement already satisfied: charset-normalizer~=2.0.0 in /usr/local/lib/pyt
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.9/
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/local/lib/python3.9/c
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in /usr/local/lib/python3.
```

```
!sudo curl https://storage.googleapis.com/rl-infra-public/circuit-training/placemen
-o /usr/local/bin/plc_wrapper_main
```

% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Currer
			Dload Upload	Total	Spent	Left	Speed
0 0	0 0	0 0	0 0	--:--:--	--:--:--	--:--:--	0

```
Warning: busy
0 9881k 0 1377 0 0 5620 0 0:30:00 --:--:-- 0:30:00 5597
curl: (23) Failed writing body (0 != 1377)
```

```
!sudo chmod 555 /usr/local/bin/plc_wrapper_main
```

```
!git clone https://github.com/google-research/circuit-training.git
```

```
Cloning into 'circuit-training'...
remote: Enumerating objects: 1176, done.
remote: Counting objects: 100% (335/335), done.
remote: Compressing objects: 100% (139/139), done.
remote: Total 1176 (delta 291), reused 212 (delta 196), pack-reused 841
Receiving objects: 100% (1176/1176), 959.61 KiB | 395.00 KiB/s, done.
Resolving deltas: 100% (814/814), done.
Updating files: 100% (106/106), done.
```

```
!git clone https://github.com/limbo018/DREAMPlace.git
```

```
Cloning into 'DREAMPlace'...
remote: Enumerating objects: 8329, done.
remote: Counting objects: 100% (790/790), done.
remote: Compressing objects: 100% (116/116), done.
remote: Total 8329 (delta 711), reused 689 (delta 674), pack-reused 7539
Receiving objects: 100% (8329/8329), 17.17 MiB | 2.26 MiB/s, done.
Resolving deltas: 100% (6528/6528), done.
Updating files: 100% (600/600), done.
```

```
%mkdir -p /dreamplace
```

```
!curl https://storage.googleapis.com/rl-infra-public/circuit-training/dreamplace/dr
```

% Total	% Received	% Xferd	Average Speed	Time	Time	Time	Currer
			Dload Upload	Total	Spent	Left	Speed
100 9256k	100 9256k	0 0	9702k 0	--:--:--	--:--:--	--:--:--	9702k

```
!tar xzf /dreamplace/dreamplace.tar.gz -C /dreamplace/
```

```
import os
os.environ['PYTHONPATH'] += ":/dreamplace:/dreamplace/dreamplace"
#!export "PYTHONPATH='${PYTHONPATH}:/dreamplace:/dreamplace/dreamplace'"
```

```
!sudo apt-get install -y \
    flex \
    libcairo2-dev \
    libboost-all-dev
```

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
flex is already the newest version (2.6.4-6.2).
libcairo2-dev is already the newest version (1.16.0-4ubuntu1).
libboost-all-dev is already the newest version (1.71.0.0ubuntu2).
0 upgraded, 0 newly installed, 0 to remove and 23 not upgraded.
```

```
!python3 -mpip install pyunpack>=0.1.2 \
    patool>=1.12 \
    timeout-decorator>=0.5.0 \
    matplotlib>=2.2.2 \
    cairocffi>=0.9.0 \
    pkgconfig>=1.4.0 \
    setuptools>=39.1.0 \
    scipy>=1.1.0 \
    numpy>=1.15.4 \
    torch==1.13.1 \
    shapely>=1.7.0
```

```
%cd /content/circuit-training/
```

```
!pwd
```

```
!ls
```

```
/content/circuit-training
/content/circuit-training
'=0.1.2'  '=1.15.4'  circuit-training  docs          PRINCIPLES.md
'=0.5.0'  '=1.4.0'   circuit_training  DREAMPlace   README.md
'=0.9.0'  '=1.7.0'   CODE_OF_CONDUCT.md LICENSE       setup.py
'=1.1.0'  '=2.2.2'   conftest.py      logs         tools
'=1.12'   '=39.1.0'  CONTRIBUTING.md  nohup.out    tox.ini
```

```
os.environ['ROOT_DIR'] = "./logs/run_01"
os.environ['REVERB_PORT'] = "8008"
os.environ['REVERB_SERVER'] = "127.0.0.1:"+os.environ['REVERB_PORT']
os.environ['NETLIST_FILE'] = "./circuit_training/environment/test_data/ariane/netli
os.environ['INIT_PLACEMENT'] = "./circuit_training/environment/test_data/ariane/ini
```

```
!nohup python3 -m circuit_training.learning.ppo_reverb_server \
  --root_dir=${ROOT_DIR} --port=${REVERB_PORT} &
```

```
nohup: appending output to 'nohup.out'
```

```
!nohup python3 -m circuit_training.learning.train_ppo \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --gin_bindings='train.num_episodes_per_iteration=16' \
  --gin_bindings='train.per_replica_batch_size=64' \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=0 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=1 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=2 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

```
!nohup python3 -m circuit_training.learning.eval \
  --root_dir=${ROOT_DIR} \
  --variable_container_server_address=${REVERB_SERVER} \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

```
nohup: appending output to 'nohup.out'
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nohup: appending output to 'nohup.out'
```

```
%load_ext tensorboard
```

```
%tensorboard --logdir ./logs --port 8000
```

```

The tensorboard extension is already loaded.
%reload_ext tensorboard
Reusing TensorBoard on port 8000 (pid
1891), started 2:29:53 ago. (Use
'!kill 1891' to kill it.)

```

TensorBoard

Filter	Filter tags (regex)	All
<input checked="" type="checkbox"/> Run	Pinned	Set
<input checked="" type="checkbox"/> run_ /111 /trai	<i>Pin cards for a quick view and comparison</i>	GENI
<input checked="" type="checkbox"/> run_ /111 /trai 0	Metrics 13 cards	Horiz
<input checked="" type="checkbox"/> run_ /111 /trai	Previous Next	Step
 - . .	E (

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=3 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

nohup: appending output to 'nohup.out'

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=4 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

nohup: appending output to 'nohup.out'

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=5 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

nohup: appending output to 'nohup.out'

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=6 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

nohup: appending output to 'nohup.out'

```
!nohup python3 -m circuit_training.learning.ppo_collect \
  --root_dir=${ROOT_DIR} \
  --replay_buffer_server_address=${REVERB_SERVER} \
  --variable_container_server_address=${REVERB_SERVER} \
  --task_id=7 \
  --netlist_file=${NETLIST_FILE} \
  --init_placement=${INIT_PLACEMENT} &
```

```
nohup: appending output to 'nohup.out'
```

```
!nohup python3 -m circuit_training.learning.ppo_collect \  
--root_dir=${ROOT_DIR} \  
--replay_buffer_server_address=${REVERB_SERVER} \  
--variable_container_server_address=${REVERB_SERVER} \  
--task_id=8 \  
--netlist_file=${NETLIST_FILE} \  
--init_placement=${INIT_PLACEMENT} &
```

```
nohup: appending output to 'nohup.out'
```

Double-click (or enter) to edit

```
#!cat nohup.out
```

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