TASK 2: Replacer (MRU)

Реализовать в Champsim политику замещения для L2 кэша и сравнить ее с LRU на наборе benchmark-ов из 1-го задания. В качестве политики замещения можно взять любую (Pseuso-LRU, MRU, LFU, ARC, 2Q, NRU, Mockingjay, Hawkeye, etc) кроме тех, что в Champsim уже есть.

In [ ]:
```
%load_ext autoreload
%autoreload 2
```

```
The autoreload extension is already loaded. To reload it, use:
  %reload_ext autoreload
```

In [ ]:
```
import sys
sys.path.append('../task1/')
from my_utils import *

CHAMPSIM_PATH = '/home/dadrozdov/repos/ChampSim'
TRACES_PATH = '/home/dadrozdov/repos/ChampSim/tasks/task_traces'

WARMUP_INSTRUCTIONS = 5_000_000
SIMULATION_INSTRUCTIONS = 20_000_000
```

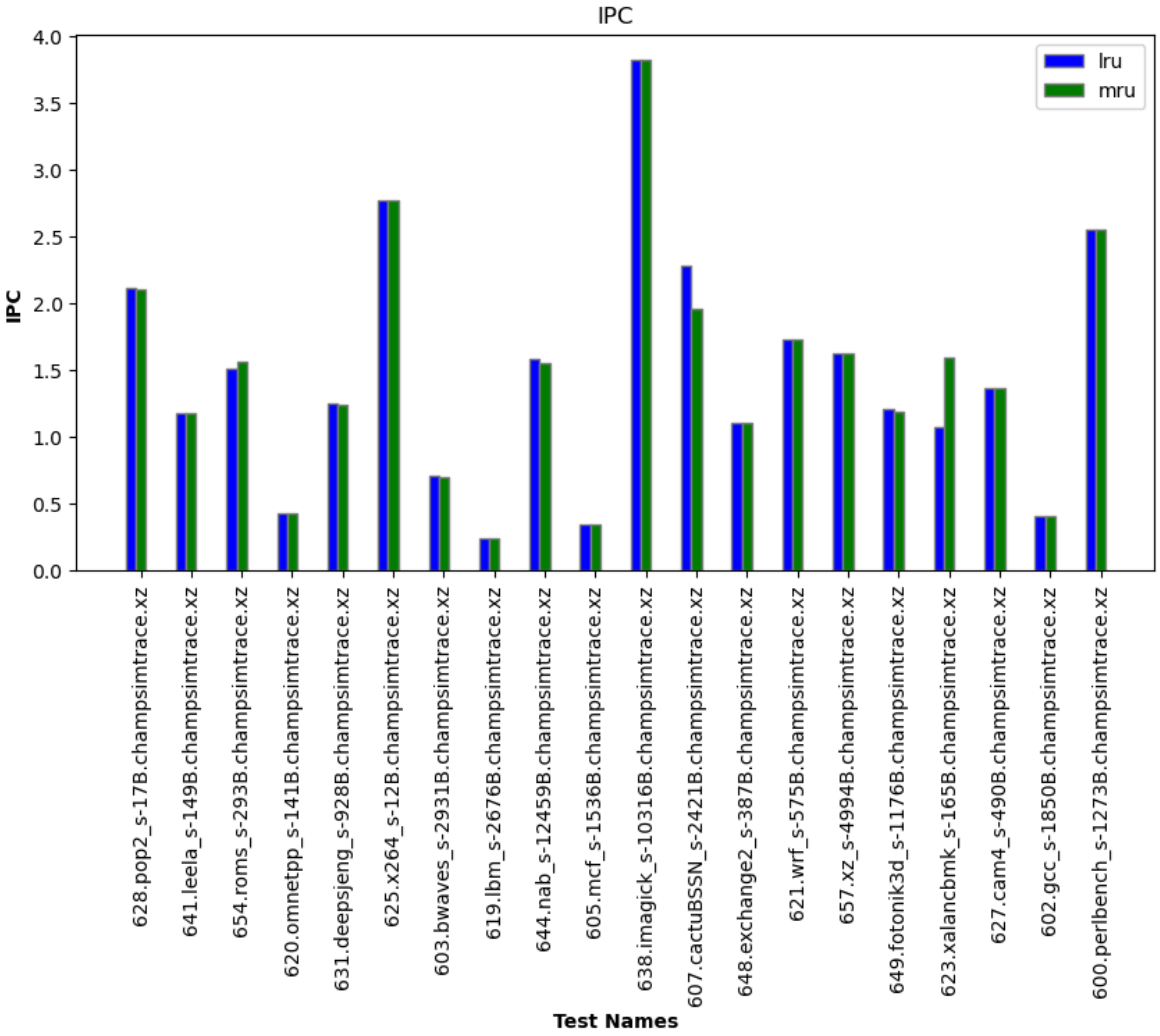
In [ ]:
```
base_metrics = obtain_perf_metrics(TRACES_PATH, CHAMPSIM_PATH, "champsim_
```

In [ ]:
```
mru_metrics = obtain_perf_metrics(TRACES_PATH, CHAMPSIM_PATH, "champsim_c
```

In [ ]:
```
import pandas as pd

# pd.DataFrame(base_metrics).to_csv("base_metrics.csv")
# pd.DataFrame(mru_metrics).to_csv("mru_metrics.csv")
base_metrics = pd.read_csv("base_metrics.csv", index_col=0)
mru_metrics = pd.read_csv("mru_metrics.csv", index_col=0)
```

In [ ]:
```
plot_metric([base_metrics, mru_metrics], 0, "IPC", ["lru", "mru"])
```

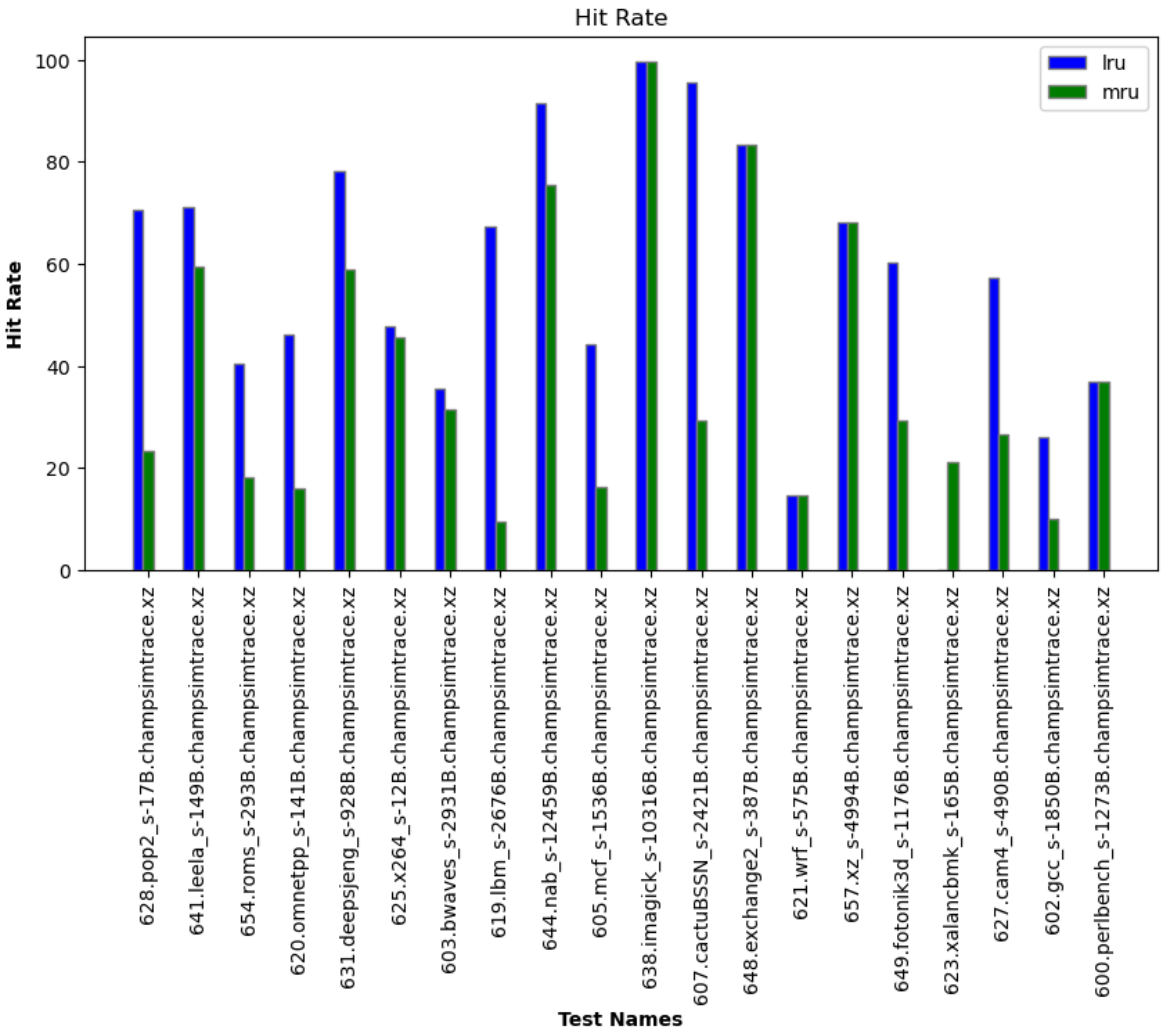


In [ ]:
```
base_ipc_s = list(map(lambda x: x[1][0], base_metrics.items()))
oracle_ipc_s = list(map(lambda x: x[1][0], mru_metrics.items()))
total = 0
for b, o in zip(base_ipc_s, oracle_ipc_s):
  total += o / b - 1
print(f"Average IPC increase {total / len(base_ipc_s) * 100} %")
```

```
Average IPC increase 1.5147704833580984 %
```

In [ ]:
```
# compute hit rate
base_hitrate = {}
mru_hitrate = {}
for (base_trace, base_m), (mru_trace, mru_m) in zip(base_metrics.items(),
  base_hitrate[base_trace] = (base_m[4] / base_m[3] * 100,)
  mru_hitrate[mru_trace] = (mru_m[4] / mru_m[3] * 100,)
```

In [ ]:
```
plot_metric([base_hitrate, mru_hitrate], 0, "Hit Rate", ["lru", "mru"])
```


Hit Rate
lru
mru
Hit Rate
0
20
40
60
80
100
628.pop2_s-17B.champsimtrace.xz
641.leela_s-149B.champsimtrace.xz
654.roms_s-293B.champsimtrace.xz
620.omnetpp_s-141B.champsimtrace.xz
631.deepsjeng_s-928B.champsimtrace.xz
625.x264_s-12B.champsimtrace.xz
603.bwaves_s-2931B.champsimtrace.xz
619.lbm_s-2676B.champsimtrace.xz
644.nab_s-12459B.champsimtrace.xz
605.mcf_s-1536B.champsimtrace.xz
638.imagick_s-10316B.champsimtrace.xz
607.cactuBSSN_s-2421B.champsimtrace.xz
648.exchange2_s-387B.champsimtrace.xz
621.wrf_s-575B.champsimtrace.xz
657.xz_s-4994B.champsimtrace.xz
649.fotonik3d_s-1176B.champsimtrace.xz
623.xalancbmk_s-165B.champsimtrace.xz
627.cam4_s-490B.champsimtrace.xz
602.gcc_s-1850B.champsimtrace.xz
600.perlbench_s-1273B.champsimtrace.xz
Test Names