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Load Balancing on SDN

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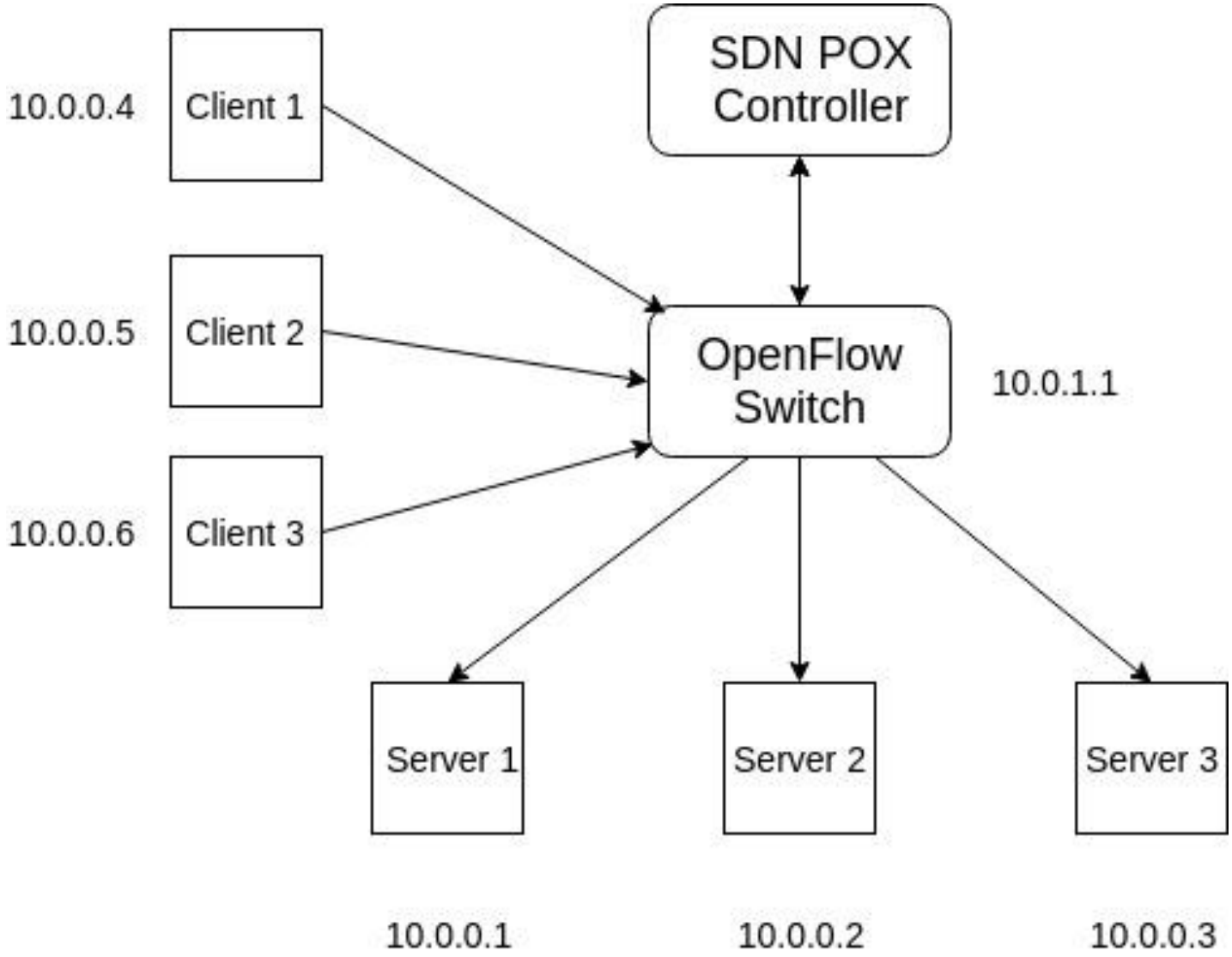
System Model



Load Balancer System Model

Implementation Challenges

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Mininet specific:

- vlan port while installation(only NAT available)
- not able to install external packets like (iperf, http-perf)
- “random.py” file name

Project specific:

- ARP packets to check whether servers are alive or not
- calculating RTT
- give servers capacity
- give packets weight

Random Algorithm


```
def pick_server():
    # pick random server from alive servers
    ip_address = random.choise(live_servers_list[])
    # return ip_address of that server
    return ip_address
```

Round-Robin Algorithm

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```
def pick_server():
    N = length(live_servers_list[])
    # index stores index of last picked server
    index = (index + 1) % N

    ip_address = live_servers_list[index]

    # return ip_address of that server
    return ip_address
```

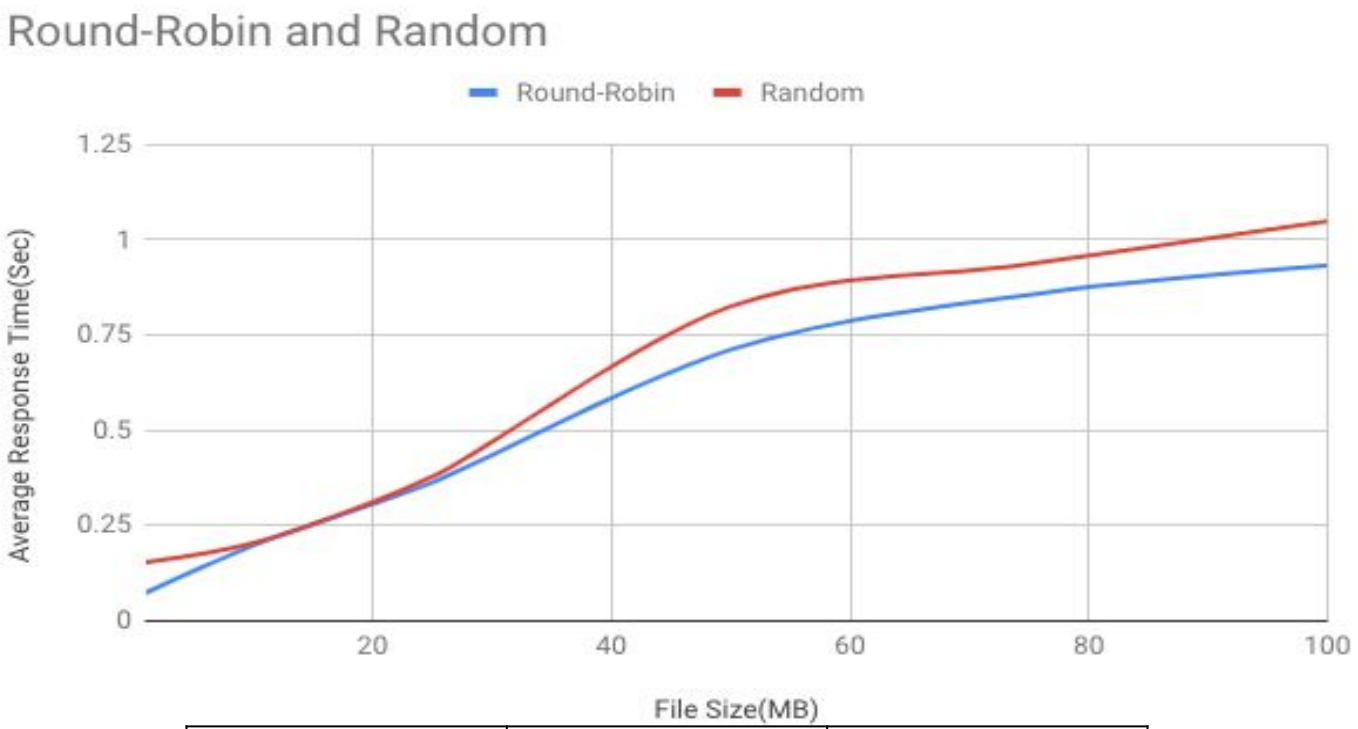
Least Connection Based


```
def pick_server():
    N = length(live_servers_list[])

    final_server = live_servers_list[0]
    current_no_of_connections = INF

    for x in live_servers_list[N]:
        # y stores current no of connections
        y = find_connections(x)
        # if it is lesser than current no of connections
        # then select that server
        if y < current_no_of_connections:
            final_server = x
            #rememver that y for future comparison
            current_no_of_connections = y

    ip_address = final_server
    # return ip_address of that server
    return ip_address
```

Weighted RR

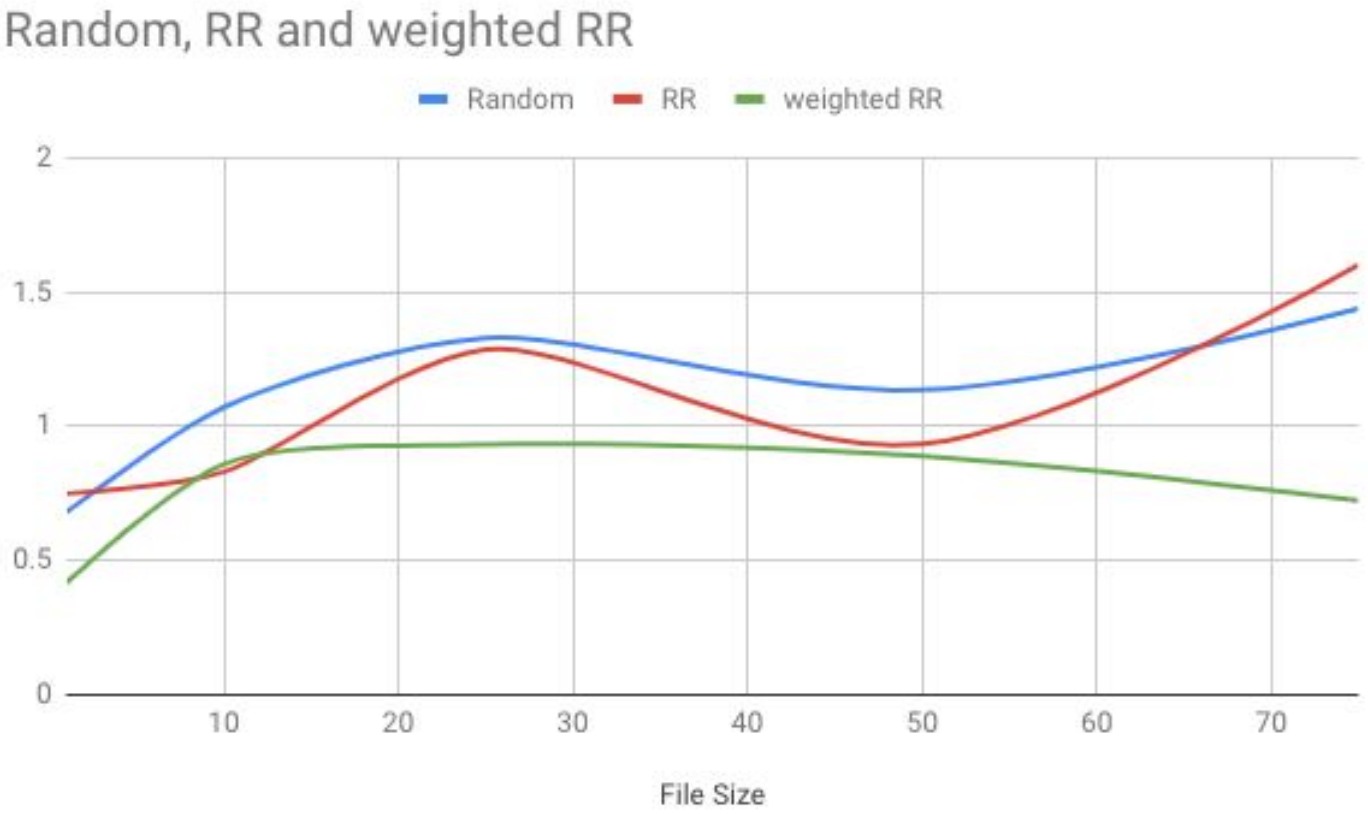

```
counter = 0
THRESHOLD[N] = {0}

def pick_server():
    N = length(live_servers_list[])
    counter = (counter + 1) % MAX_LIMIT

    final_server = live_servers_list[0]

    for x in live_servers_list[N]:
        # if counter is lesser than THRESHOLD
        if counter < THRESHOLD[x]:
            final_server = x
            ip_address = final_server
            return ip_address
        # else find next server having higher THRESHOLD
        else: x = x + 1

    return final_server
```

Random vs RR



File Size	Round-Robin	Random
1	0.07395833333	0.15375
10	0.198125	0.2039583333
25	0.3635294118	0.3782352941
50	0.7115686275	0.8249019608
75	0.8558823529	0.9360784314
100	0.9323529412	1.048431373

50 * 3 iterations



File Size	Random	RR	weighted RR
1	0.680333	0.749	0.418
10	1.07033	0.829667	0.859
25	1.32833	1.28533	0.932333
50	1.13467	0.933333	0.889
75	1.438	1.6	0.722333

100 * 3 iterations

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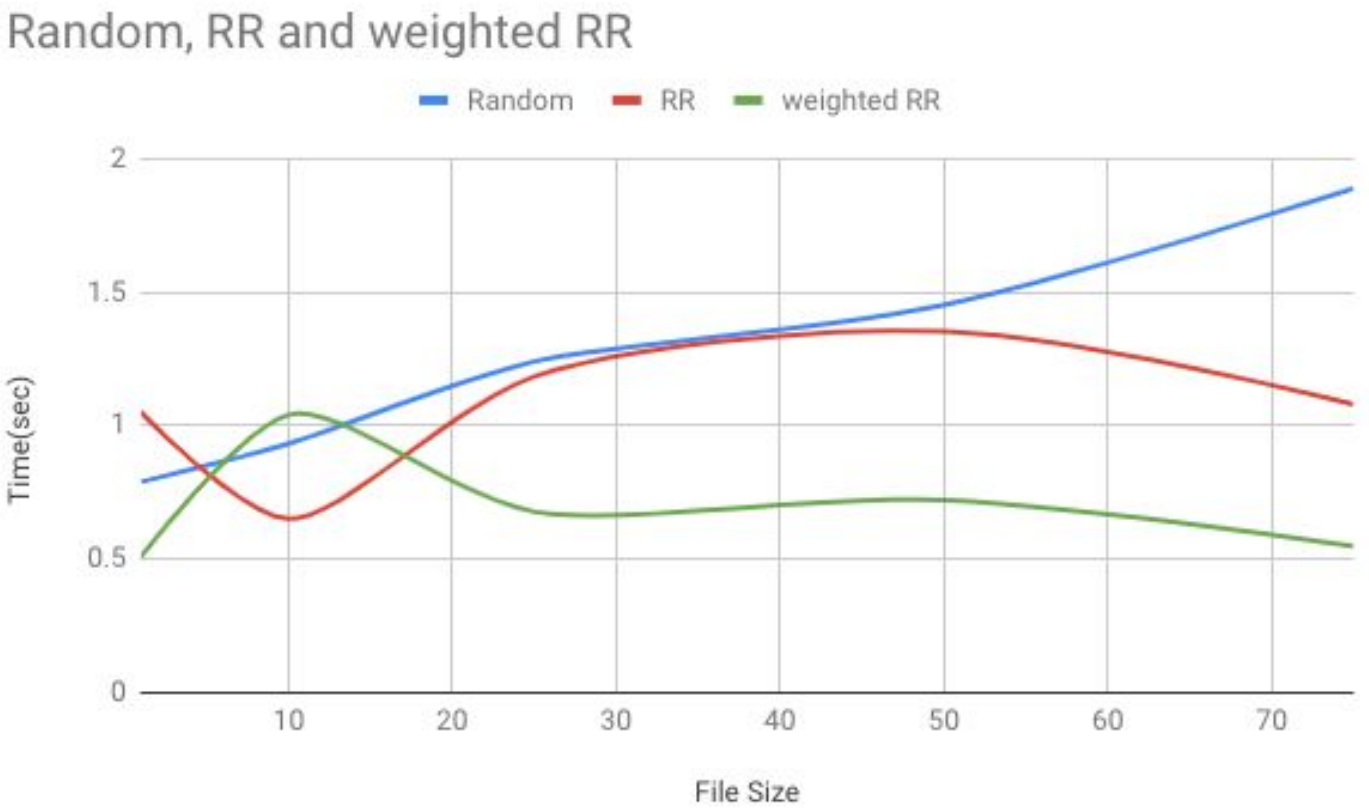

File Size	Random	RR	weighted RR
1	0.7895	1.0505	0.5085
10	0.932167	0.6505	1.04017
25	1.23967	1.18317	0.677333
50	1.45217	1.35267	0.721167
75	1.8885	1.0795	0.548333

Turn Around Time (packets with diff. size)

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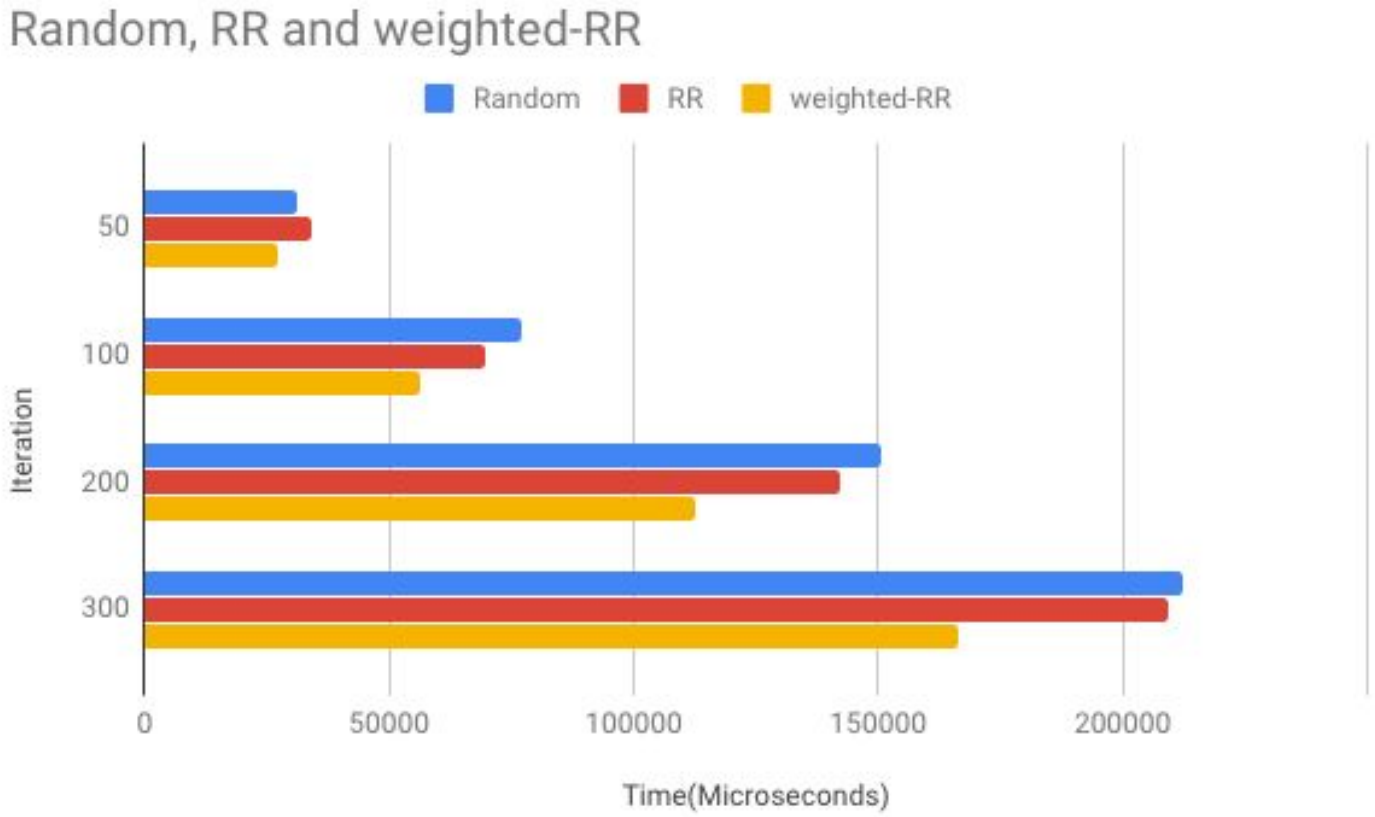
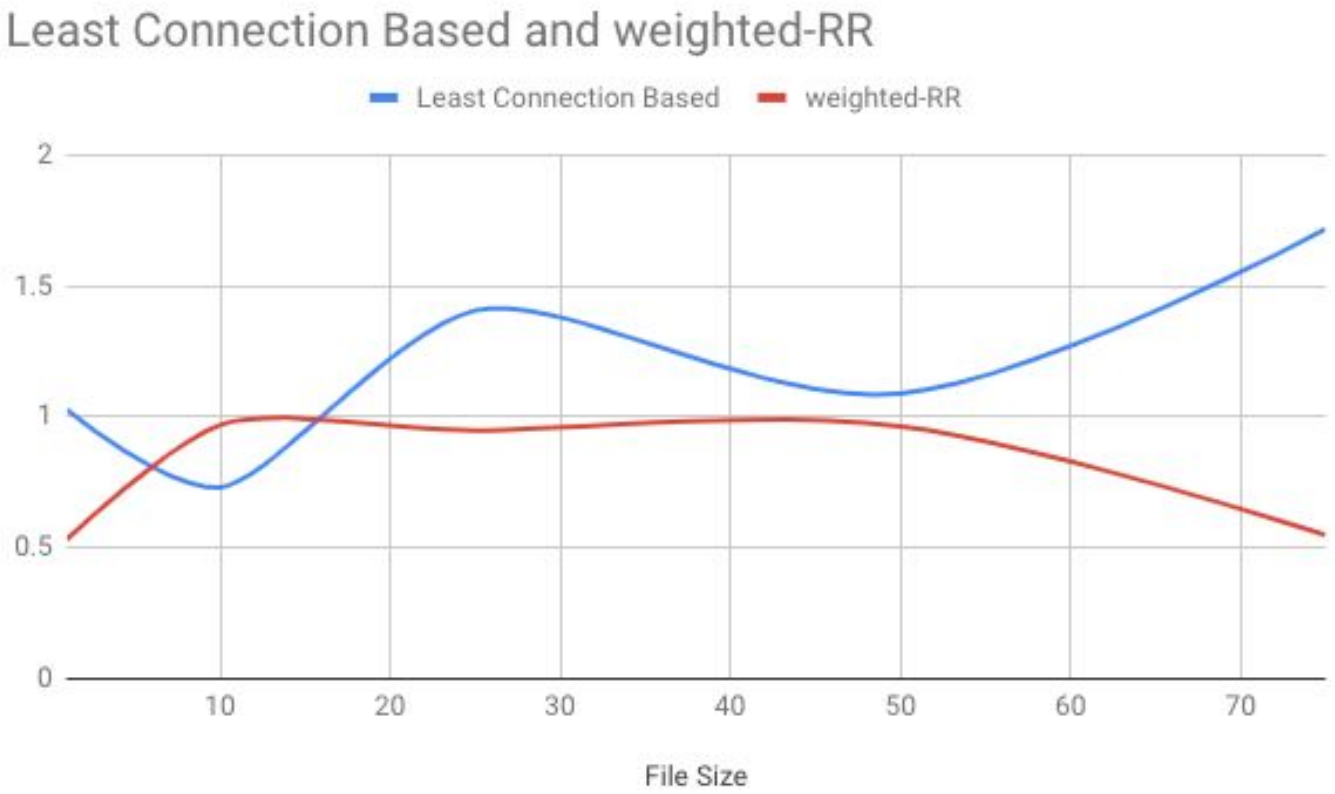


Iteration	Random	RR	weighted-RR
50	31388.804	33997.289	27375.259
100	77032.588	69841.801	56255.486
200	150419.423	142287.505	112495.153
300	212460.915	209429.211	166604.749

Least Connection vs weighted-RR



File Size	Least Connection Based	weighted-RR
1	1.02533	0.533667
10	0.73	0.969
25	1.4055	0.947667
50	1.08867	0.9635
75	1.71617	0.548167

Turn Around Time (packets with same size)

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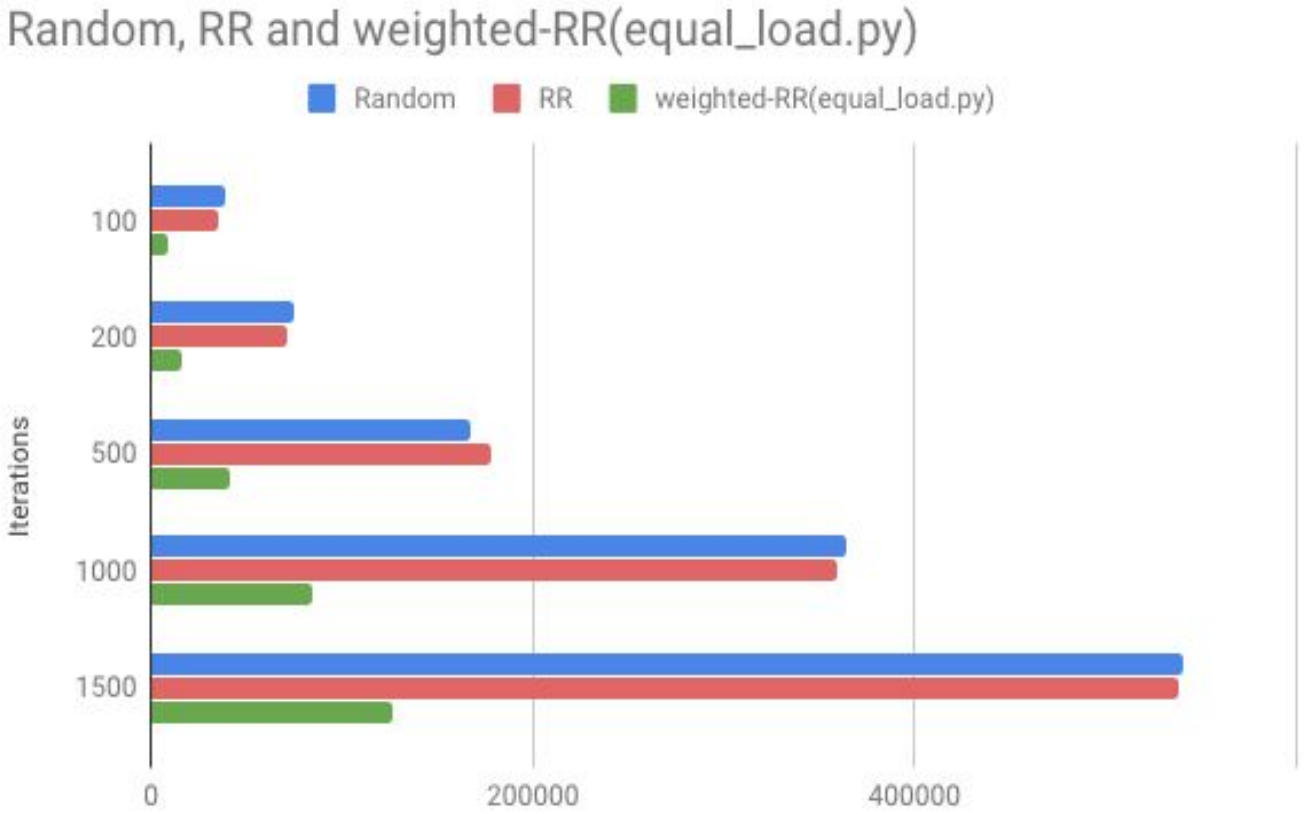

Iterations	Random	RR	weighted-RR(equal_load.py)
100	38496.255	35544.115	8444.825
200	74705.323	71727.752	16428.513
500	167638.835	178612.654	41555.514
1000	364786.688	359001.205	84330.728
1500	540187.439	538257.512	126570.55

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Thank You !!