

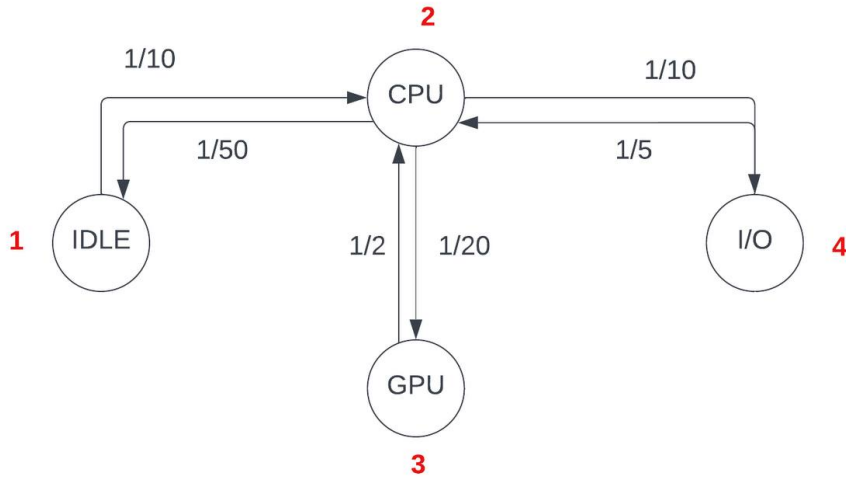
## CTMC Performance Indices

To have this assignment evaluated for the in-class exam, please upload on WeBeep a ZIP file including:

- the source code used to solve this assignment
- this file, with the table below properly filled

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CTMC  
drawing:



```
graph TD; IDLE((IDLE)) -- 1/10 --> CPU((CPU)); CPU -- 1/50 --> IDLE; CPU -- 1/2 --> GPU((GPU)); GPU -- 1/20 --> CPU; CPU -- 1/10 --> IO((I/O)); IO -- 1/5 --> CPU; style IDLE stroke:#f00,stroke-width:2px; style CPU stroke:#f00,stroke-width:2px; style GPU stroke:#f00,stroke-width:2px; style IO stroke:#f00,stroke-width:2px;
```

Infinitesimal generator matrix:

-0.1000	0.1000	0	0
0.0200	-0.1700	0.0500	0.1000
0	0.5000	-0.5000	0
0	0.2000	0	-0.2000

State reward vectors, and transition reward matrices:

% Power consumption vector

alpha = [0.1 2 10 0.5]

% Utilization vector

alpha1 = [0 1 1 1]

% transition reward matrices:

System throughput matrix

0	0	0	0
1	0	0	0
0	0	0	0
0	0	0	0

GPU throughput matrix

0	0	0	0
0	0	0	0
0	1	0	0
0	0	0	0

I/O throughput matrix

0	0	0	0
0	0	0	0
0	0	0	0
0	1	0	0

Figure with the evolution of the state probabilities as function of time.

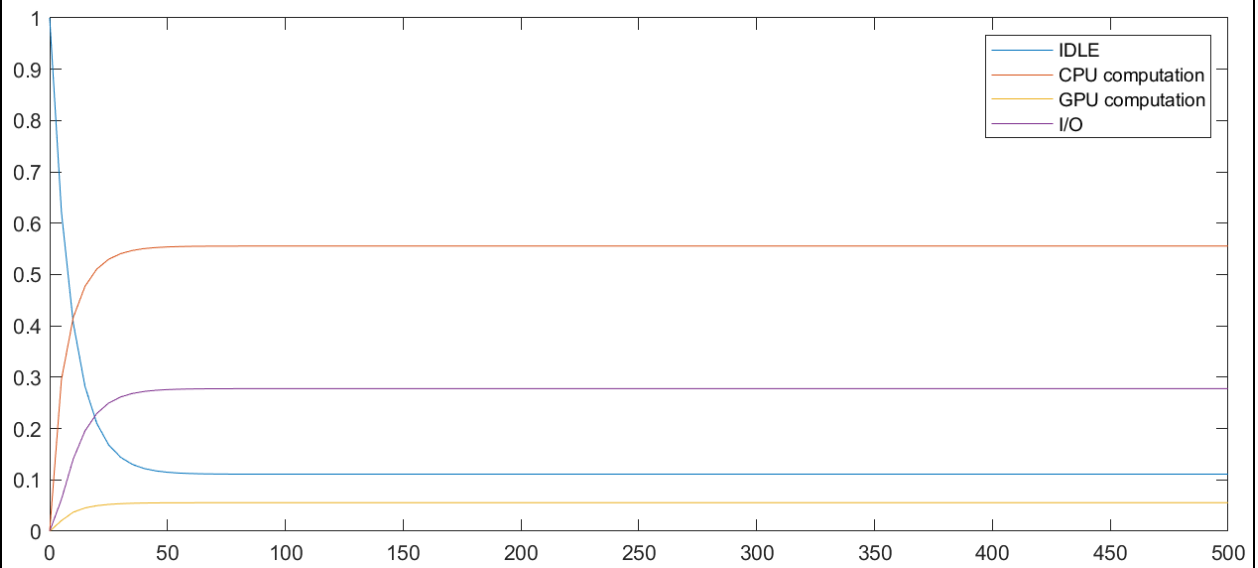
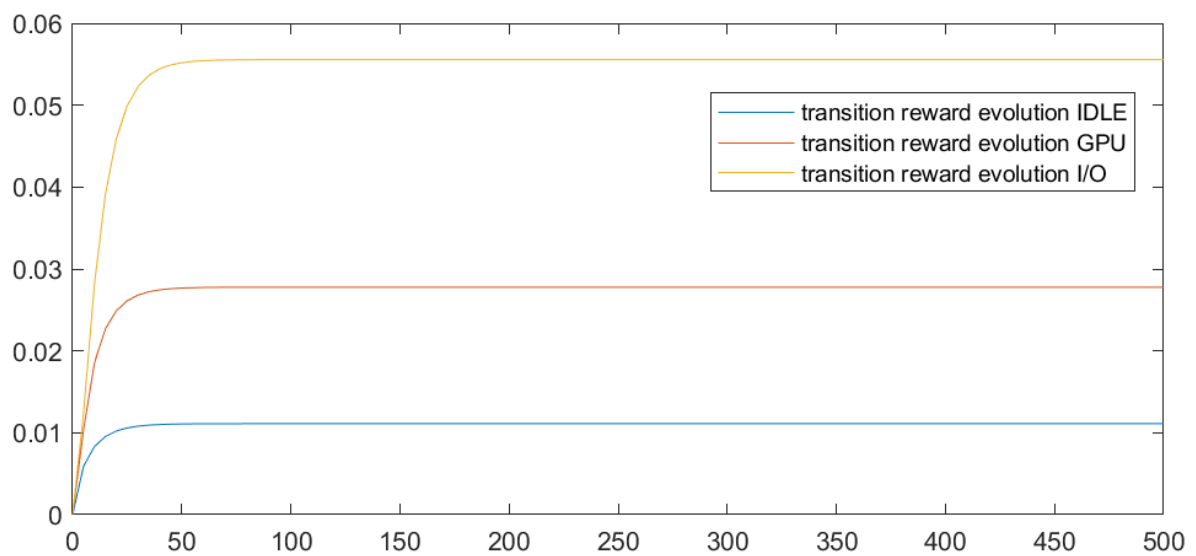
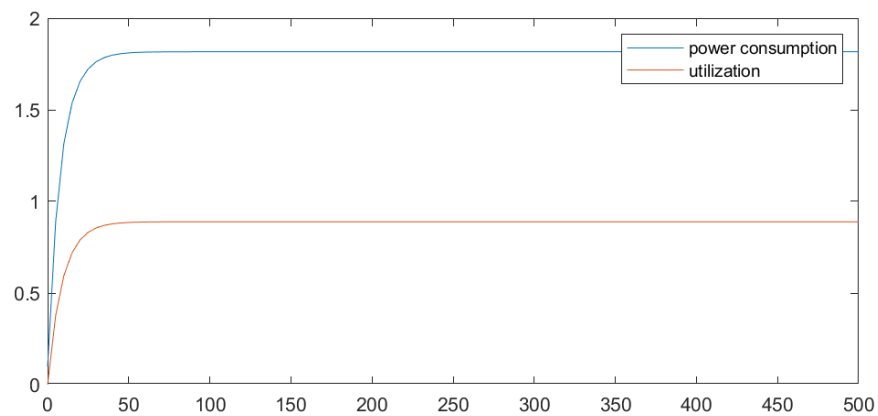


Figure with the evolution of the rewards as function of time



Steady state probabilities, and limit rewards.

Steady state probabilities:

S1	0.111111111111111
S2	0.555555555555556
S3	0.055555555555556
S4	0.277777777777778

Limit rewards:

- Power consumption: 1.8167
- Utilization: 0.8889
- System Throughput: 0.01111
- GPU Throughput: 0.027784
- I/O Frequency: 0.055556