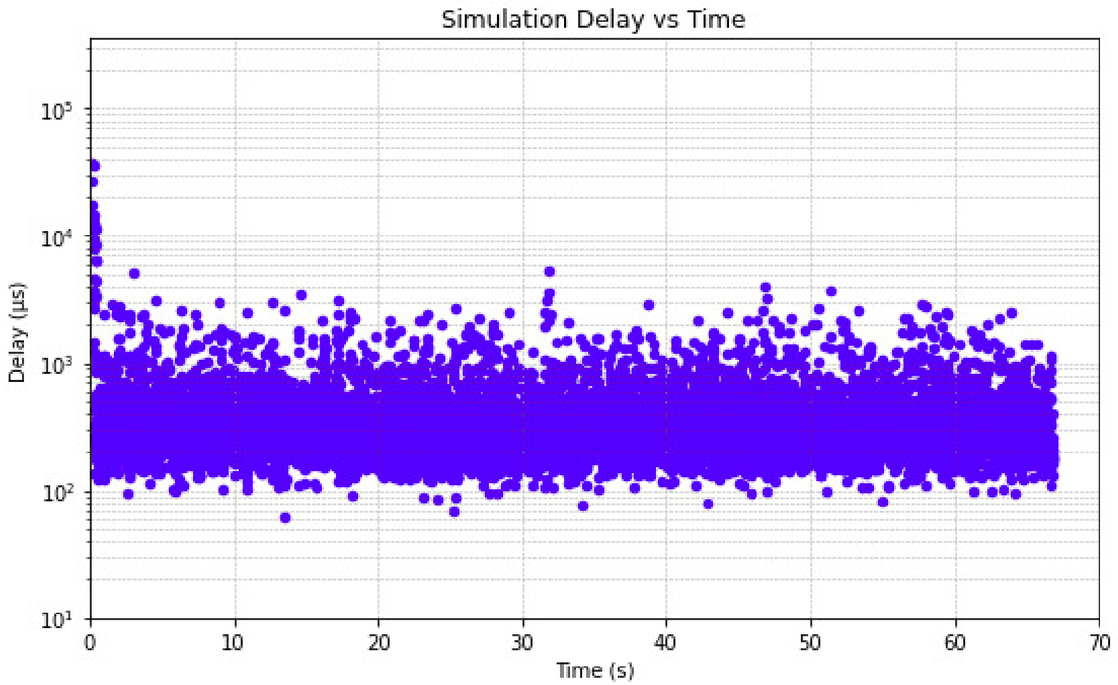
Testes de latência

Resultados anteriores

	Mínimo	Média	Máximo
Socket	**13**	**390**	**71273**
SharedMem	**1**	**207**	**68452**



(Gráfico está em escala logarítmica)

Processo de Debug

- Verificar se havia um erro lógico no código do teste
- Eliminar camadas da API a fim de identificar aonde estava o atraso
- Teste apenas com Engine de sockets
- Teste apenas com sockets
- Flag O_ASYNC e inicialização do programa

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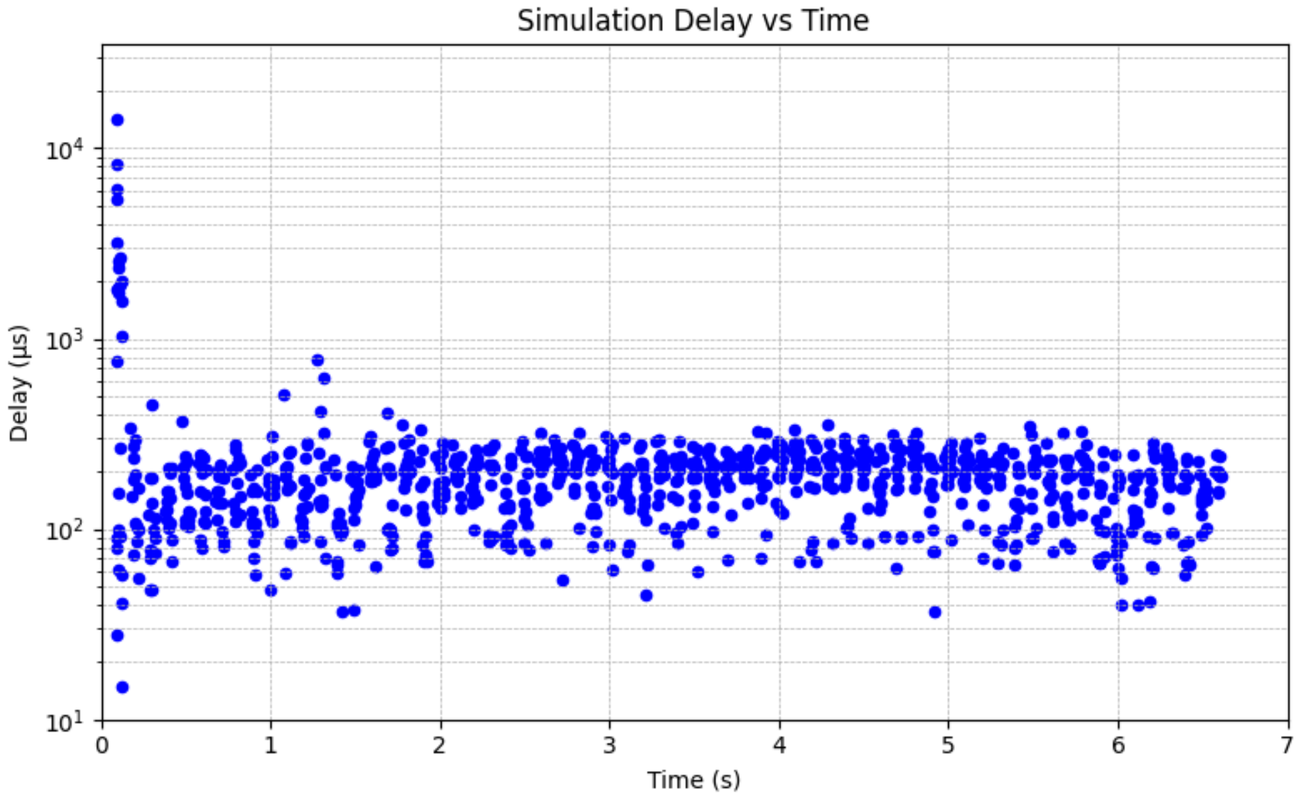
- Máximo de 14173 micro
- Altos delays no inicio do teste continuam



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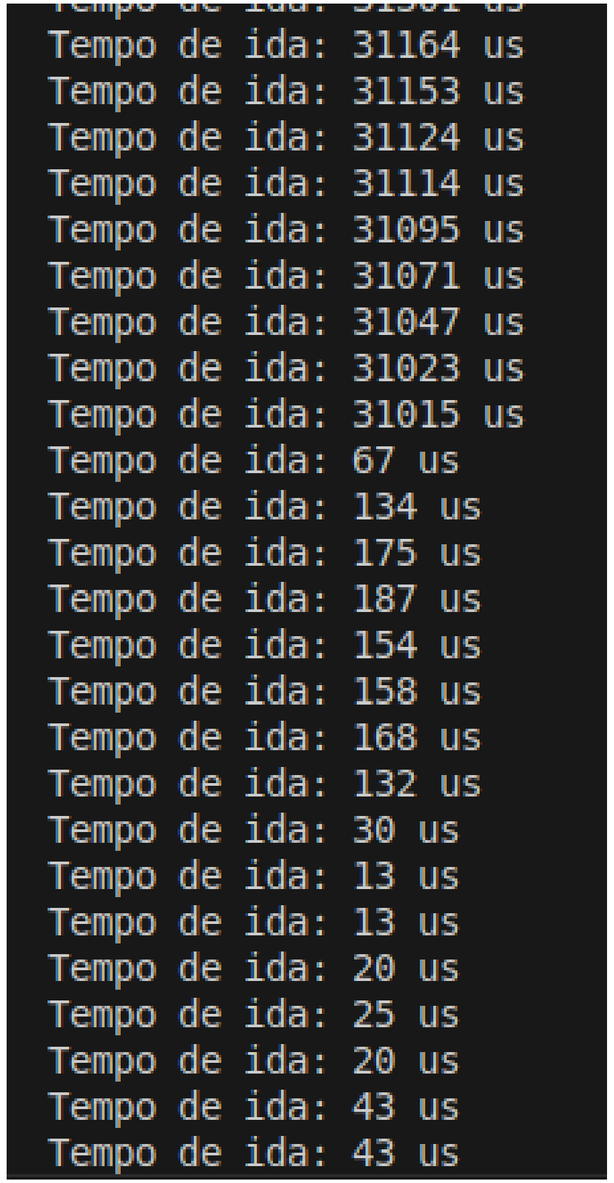

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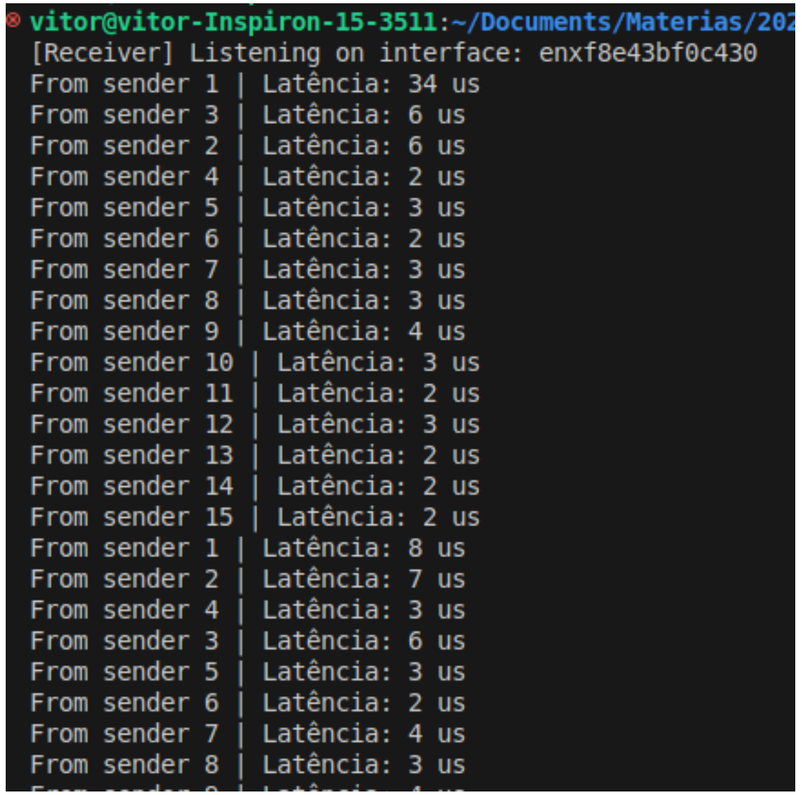

Processo de Debug

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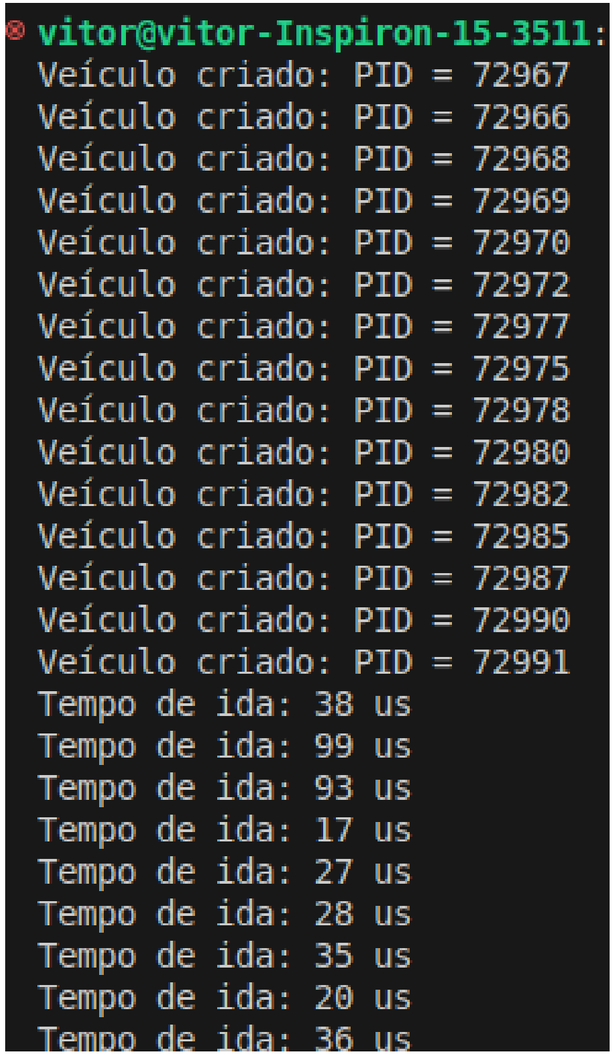
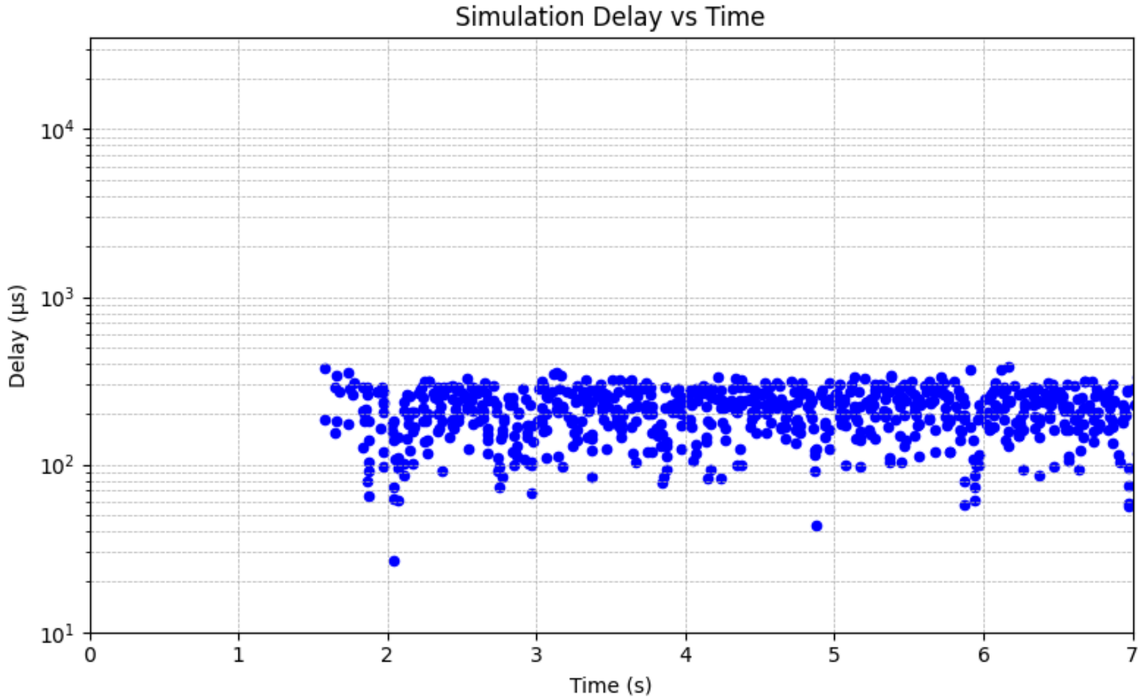
```
132         // O_ASYNC faz com que o socket levante o sinal SIGIO quando operacoes de
133         // I/O acontecerem
134         // O_NONBLOCK faz com que operações normalmente bloqueantes
135         // não bloqueiem
136         if (fcntl(sockfd, F_SETFL, flags | O_ASYNC | O_NONBLOCK) <
137             0) {
138         perror("fcntl F_SETFL");
139         exit(EXIT_FAILURE);
140         }
```

- Ao remover O_ASYNC, teste apenas com a Engine passou a dar resultados normais no início do teste
- Porém, remover a flag não é uma solução, sem ela não é possível receber SIGIOs



Resultados

	Mínimo	Média	Máximo
Socket	**16**	**211.93**	**721**
SharedMem	**1**	**1.53**	**58**



Processo de Debug parte 2

- Testar recepção assíncrona apenas com sockets
- Testar recepção assíncrona a partir da Engine
- Testar recepção assíncrona a partir da NIC

Processo de Debug parte 2

- **Testar recepção assíncrona apenas com sockets**
- Testar recepção assíncrona a partir da Engine
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Tempos de delay entre envio e recebimento:
2, 244, 208, 118, 91, 89, 44, 40, 21, 93, 33, 25, 82, 35, 20, 90, 108, 78, 81, 27, 27, 36, 44, 29, 95, 36, 19, 85, 16, 22, 87, 98, 86, 45, 19, 22, 21, 41, 14, 96, 36, 18, 99, 32, 18, 1
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89, 29, 13, 11, 9, 10, 6, 8, 14, 12, 10, 8, 7, 6, 6, 49, 86, 63, 65, 29, 8, 25, 28, 17, 13, 12, 18, 17, 29, 20, 19, 97, 49, 28, 15, 18, 22, 30, 11, 18, 16, 24, 21, 37, 19, 22, 71, 13,
29, 25, 27, 12, 16, 29, 16, 19, 13, 17, 18, 14, 13, 87, 43, 46, 30, 64, 53, 46, 26, 25, 16, 24, 20, 30, 18, 18, 29, 11, 10, 8, 8, 9, 14, 6, 6, 12, 7, 9, 9, 7, 6, 29, 11, 10, 8, 6, 10,
15, 6, 6, 16, 14, 7, 10, 7, 6, 75, 38, 36, 9, 15, 24, 23, 15, 14, 36, 16, 23, 14, 14, 14, 90, 56, 39, 21, 17, 27, 27, 17, 16, 38, 20, 26, 15, 17, 15, 44, 9, 9, 15, 9, 14, 10, 19, 8, 12
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, 14, 15, 15, 74, 46, 34, 38, 17, 27, 26, 18, 17, 14, 15, 16, 14, 15, 15, 40, 17, 11, 18, 8, 15, 13, 9, 10, 9, 8, 9, 8, 9, 8, 117, 106, 109, 41, 47, 40, 42, 15, 29, 88, 44, 20, 86, 48,
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7, 6, 6, 6, 9, 30, 8, 12, 7, 7, 10, 14, 8, 8, 16, 15, 8, 6, 7, 9, 52, 23, 12, 7, 7, 10, 13, 6, 13, 6, 10, 6, 6, 9, 7, 80, 55, 32, 9, 13, 23, 41, 13, 13, 12, 13, 12, 11, 20, 14, 220, 22
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61, 44, 33, 36, 9, 12, 16, 18, 19, 15, 14, 15, 23, 95, 64, 44, 37, 29, 39, 14, 13, 32, 16, 21, 15, 15, 16, 28, 74, 39, 20, 34, 27, 34, 9, 18, 23, 22, 15, 15, 14, 15, 25, 80, 53, 16, 21
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10, 8, 8, 47, 48, 35, 13, 9, 23, 16, 16, 14, 11, 15, 16, 11, 9, 8, 36, 14, 16, 10, 8, 12, 16, 19, 12, 8, 9, 6, 8, 9, 8, 3248, 3206, 3195, 3185, 3049, 3049, 3030, 3018, 2929, 2903, 2058
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Processo de Debug parte 2

- Testar recepção assíncrona apenas com sockets
- **Testar recepção assíncrona a partir da Engine**
  - Resultados idênticos ao anterior
- Testar recepção assíncrona a partir da NIC

Processo de Debug parte 2

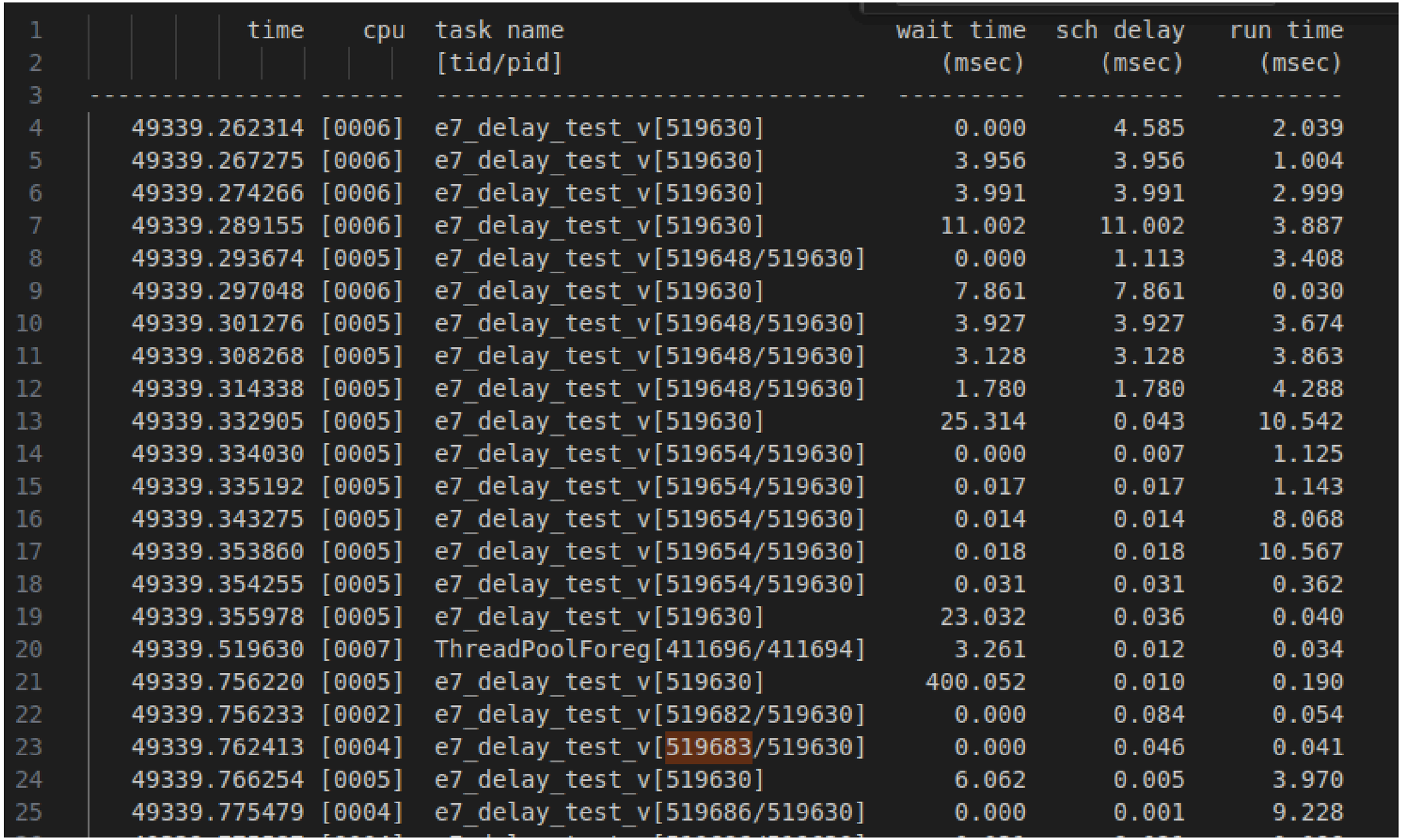
- Testar recepção assíncrona apenas com sockets
- Testar recepção assíncrona a partir da Engine
- **Testar recepção assíncrona a partir da NIC**
  - Foram encontrados atrasos de 1 a 2 milissegundos devido ao construtor da NIC inicializar as pools de buffer.

Ferramentas para debugging

- **Strace**: ferramenta utilizada para verificar quanto tempo o código demorou para retornar de uma syscall
  - Os tempos para sair de um recvfrom raramente passavam de 400 microssegundos utilizando a ferramenta, testando sem ela, apenas pelo código, era ainda menor.

Ferramentas para debugging

- **Perf**: ferramenta utilizada para verificar quanto tempo se passou desde que o processo/thread foi acordado até o momento em que ele realmente começou a executar.
  - Realmente, no início do programa os processos demoravam milissegundos para executar.



time	cpu	task name [tid/pid]	wait time (msec)	sch delay (msec)	run time (msec)
49339.262314	[0006]	e7_delay_test_v[519630]	0.000	4.585	2.039
49339.267275	[0006]	e7_delay_test_v[519630]	3.956	3.956	1.004
49339.274266	[0006]	e7_delay_test_v[519630]	3.991	3.991	2.999
49339.289155	[0006]	e7_delay_test_v[519630]	11.002	11.002	3.887
49339.293674	[0005]	e7_delay_test_v[519648/519630]	0.000	1.113	3.408
49339.297048	[0006]	e7_delay_test_v[519630]	7.861	7.861	0.030
49339.301276	[0005]	e7_delay_test_v[519648/519630]	3.927	3.927	3.674
49339.308268	[0005]	e7_delay_test_v[519648/519630]	3.128	3.128	3.863
49339.314338	[0005]	e7_delay_test_v[519648/519630]	1.780	1.780	4.288
49339.332905	[0005]	e7_delay_test_v[519630]	25.314	0.043	10.542
49339.334030	[0005]	e7_delay_test_v[519654/519630]	0.000	0.007	1.125
49339.335192	[0005]	e7_delay_test_v[519654/519630]	0.017	0.017	1.143
49339.343275	[0005]	e7_delay_test_v[519654/519630]	0.014	0.014	8.068
49339.353860	[0005]	e7_delay_test_v[519654/519630]	0.018	0.018	10.567
49339.354255	[0005]	e7_delay_test_v[519654/519630]	0.031	0.031	0.362
49339.355978	[0005]	e7_delay_test_v[519630]	23.032	0.036	0.040
49339.519630	[0007]	ThreadPoolForeg[411696/411694]	3.261	0.012	0.034
49339.756220	[0005]	e7_delay_test_v[519630]	400.052	0.010	0.190
49339.756233	[0002]	e7_delay_test_v[519682/519630]	0.000	0.084	0.054
49339.762413	[0004]	e7_delay_test_v[519683/519630]	0.000	0.046	0.041
49339.766254	[0005]	e7_delay_test_v[519630]	6.062	0.005	3.970
49339.775479	[0004]	e7_delay_test_v[519686/519630]	0.000	0.001	9.228

51930 é o PID do processo, 519683 é o TID da thread de recebimento daquele processo

Outra fonte de delay na API...

- Testei quanto tempo demorava para descer e subir a pilha
- Executar o calculo do MAC pela primeira vez causava um delay de pelo menos 1 milissegundo. O calculo é feito utilizando openssl