NB02-Profiling-Plotting

September 21, 2022

1 Lucata Simulation and Plotting Tools

1.0.1 Lesson Objectives

Upon completing this notebook you should be able to understand and apply the following concepts:

1) Run a simulation with timing that generates statistics for plotting.

2) Evaluate the outputs from plotting scripts.

3) Look at two different kinds of spawn primitives and compare them using their plots.

1.0.2 Environment Setup

[1]:
```
#As with the previous notebook we set up the environment for tools to be used␣
 ↪in this notebook. From the command line you can source the ../.env script.
import os

#Set the path to the latest toolset
LUCATA_BASE="/tools/emu/pathfinder-sw/22.09-beta"

os.environ["USER_NOTEBOOK_CODE"]=os.path.dirname(os.getcwd())
os.environ["PATH"]=os.pathsep.join([os.path.join(LUCATA_BASE,"bin"),os.
 ↪environ["PATH"]])
os.environ["FLAGS"]="-I"+LUCATA_BASE+"/include/"+" -L"+LUCATA_BASE+"/lib␣
 ↪-lmemoryweb"
```

1.0.3 Running Simulations for Profiling

First we build all versions of `hello-world-*.c`. Then we will demonstrate how to run simulations and run each step of the profiling meta-script, `emusim_profile`.

[2]:
```
%%bash
set -x
ls -l hello-world*.c
. ../.env
```

```
make all
set +x
```

```
-rw-r----- 1 jyoung9 gtperson 1333 Sep 21 21:20 hello-world.c
-rw-r----- 1 jyoung9 gtperson 1169 Sep 21 20:54 hello-world-spawn-at.c
-rw-r----- 1 jyoung9 gtperson 1128 Sep 21 20:54 hello-world-spawn.c
Lucata tools are added to current path from /tools/lucata/pathfinder-
sw/22.09-beta
Using Lucata toolchain at /tools/lucata/pathfinder-sw/22.09-beta.

+ ls -l hello-world.c hello-world-spawn-at.c hello-world-spawn.c
+ . ../.env
++ LUCATA_VERSION=22.09-beta
++ export LUCATA_BASE=/tools/lucata/pathfinder-sw/22.09-beta
++ LUCATA_BASE=/tools/lucata/pathfinder-sw/22.09-beta
++ PATH=/tools/lucata/pathfinder-
sw/22.09-beta/bin:/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
++ LD_LIBRARY_PATH=/tools/lucata/pathfinder-
sw/22.09-beta/lib:/usr/lib64:/usr/lib/x86_64-linux-gnu/
++ USER=
++ echo 'Lucata tools are added to current path from /tools/lucata/pathfinder-
sw/22.09-beta'
+ make all
+ set +x
```

Manually run the simulator and generate all the plots.

[3]:
```
%%bash
set -x;
mkdir -p manual_plots;
cd manual_plots;
emusim.x --capture_timing_queues -m 24 --total_nodes 2␣
 ↪--output_instruction_count -- ../hello-world.mwx;
make_tqd_plots.py hello-world.tqd;
make_map_plots.py hello-world.mps;
make_uis_plots.py hello-world.uis;
make_hpc_plots.py -f hello-world.hpc;
set +x;
```

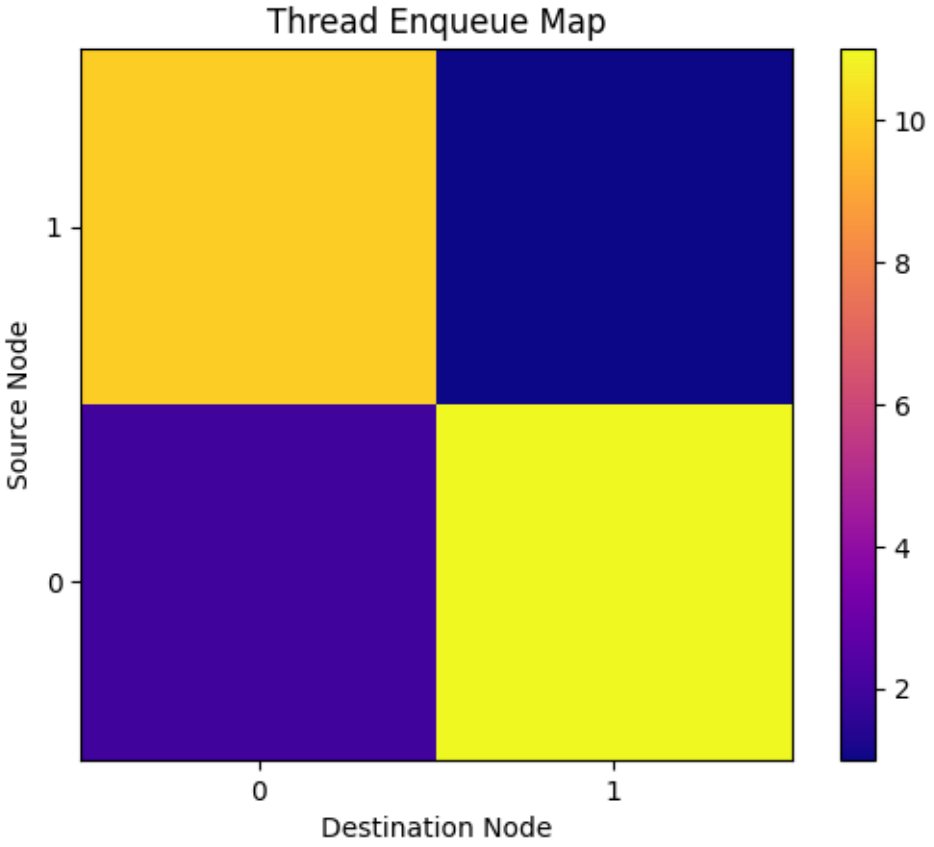
```
Start untimed simulation with local date and time= Wed Sep 21 21:21:30 2022

Timed simulation starting…
Hello, world!
End untimed simulation with local date and time= Wed Sep 21 21:21:42 2022


Info: /OSCI/SystemC: Simulation stopped by user.
Generating hello-world.MSP_Activity.png
Generating hello-world.SRIO_Outgoing_Activity.png
```

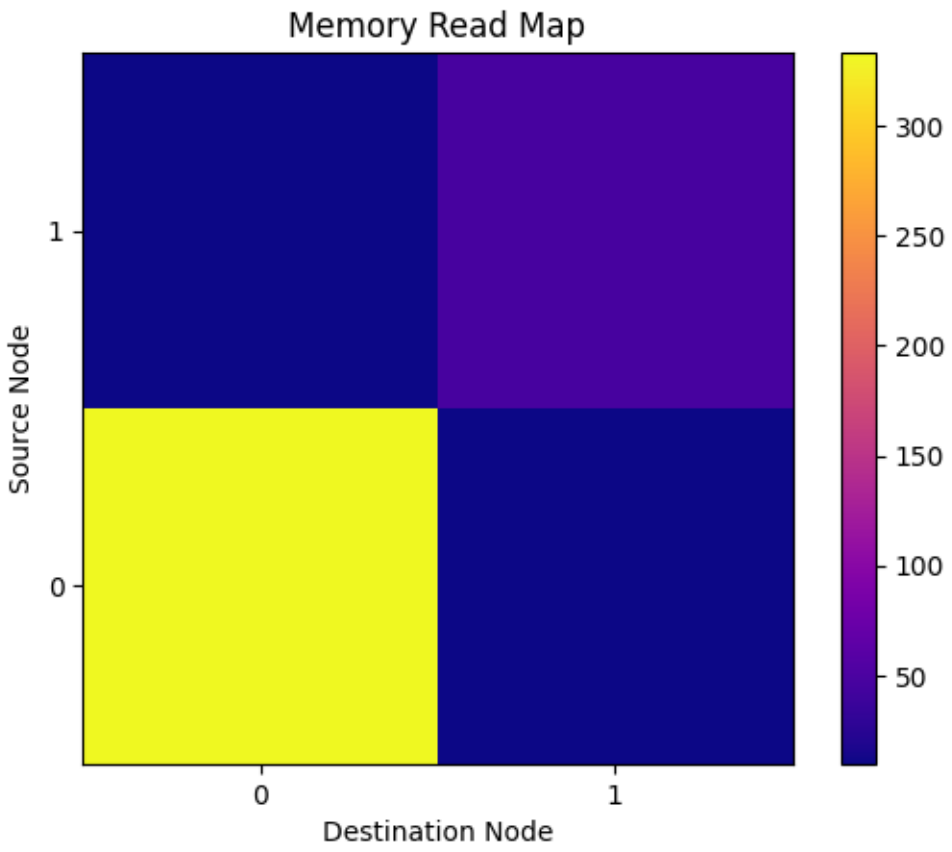
```
Generating hello-world.SRIO_Incoming_Activity.png
Generating hello-world.Live_Threads.png
Generating hello-world.Thread_Enqueue_Map.png
Generating hello-world.Memory_Read_Map.png
Generating hello-world.Memory_Write_Map.png
Generating hello-world.Atomic_Transaction_Map.png
Generating hello-world.Remote_Transaction_Map.png
Generating hello-world_total_instructions.png
Generating hello-world_total_migrations.png
Find all graphs in: ./hello-world_21-09-2022_21:22:06
The last hpc call to analyze will be 0
Program called lu_profile_perfcntr with message: HELLO WORLD STOPPING COUNTERS
AT END
Generating Graphs for [HELLO WORLD STOPPING COUNTERS AT END]…
Stopping here after read 0
hpc_file_name_base: hello-world.hpc
```

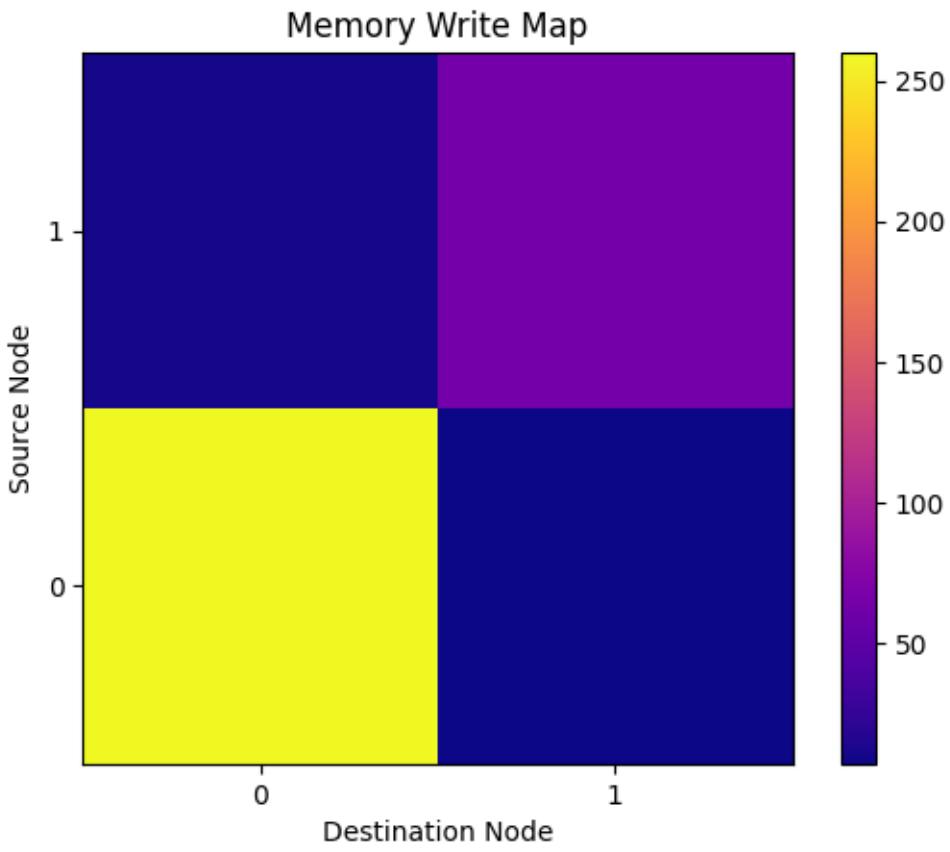
```
+ mkdir -p manual_plots
+ cd manual_plots
+ emusim.x --capture_timing_queues -m 24 --total_nodes 2
--output_instruction_count -- ../hello-world.mwx

        SystemC 2.3.3-Accellera --- Sep  7 2022 09:15:59
        Copyright (c) 1996-2018 by all Contributors,
        ALL RIGHTS RESERVED
+ make_tqd_plots.py hello-world.tqd
+ make_map_plots.py hello-world.mps
+ make_uis_plots.py hello-world.uis
+ make_hpc_plots.py -f hello-world.hpc
/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:121:
MatplotlibDeprecationWarning: Passing non-integers as three-element position
specification is deprecated since 3.3 and will be removed two minor releases
later.
  plt.subplot(subplotX, subplotY, subplotNum)  # place the graph in the correct
subplot in the figure
/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. The bottom and top margins cannot be made large enough
to accommodate all axes decorations.
  plt.tight_layout()
/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. tight_layout cannot make axes height small enough to
accommodate all axes decorations
  plt.tight_layout()
+ set +x
```

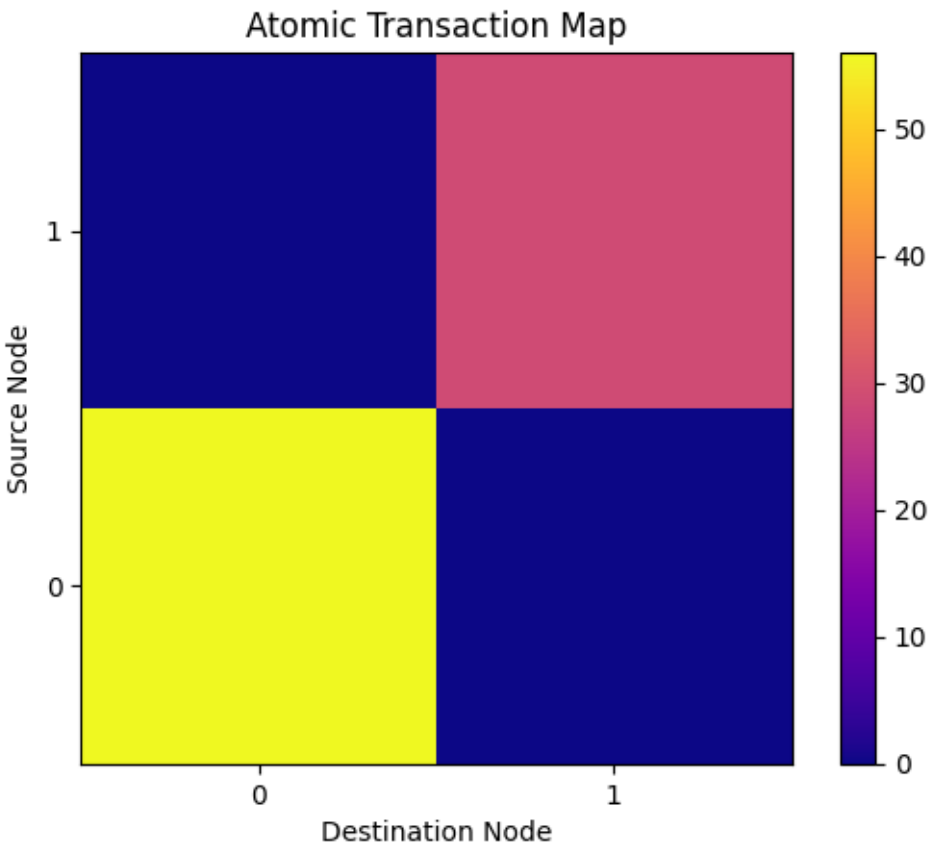
[4]:
```
from IPython.display import Image, display

display(Image(filename="manual_plots/hello-world.Thread_Enqueue_Map.png"))
```

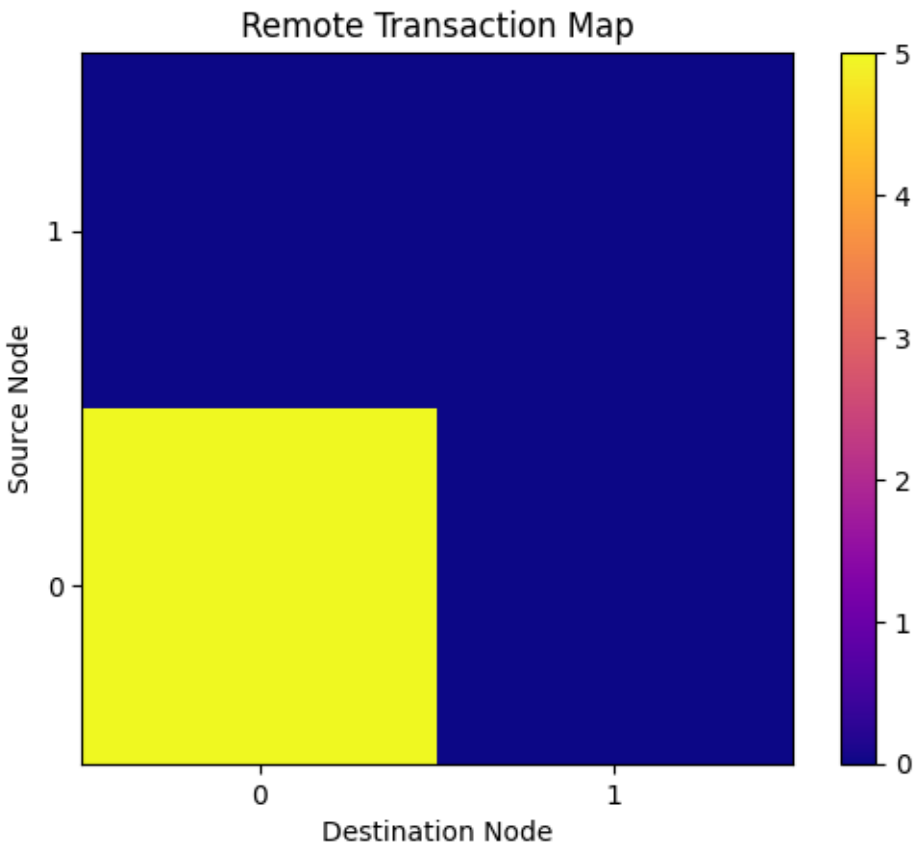
```
display(Image(filename="manual_plots/hello-world.Memory_Read_Map.png"))
display(Image(filename="manual_plots/hello-world.Memory_Write_Map.png"))
display(Image(filename="manual_plots/hello-world.Atomic_Transaction_Map.png"))
display(Image(filename="manual_plots/hello-world.Remote_Transaction_Map.png"))
display(Image(filename="manual_plots/hello-world_total_instructions.png"))
```

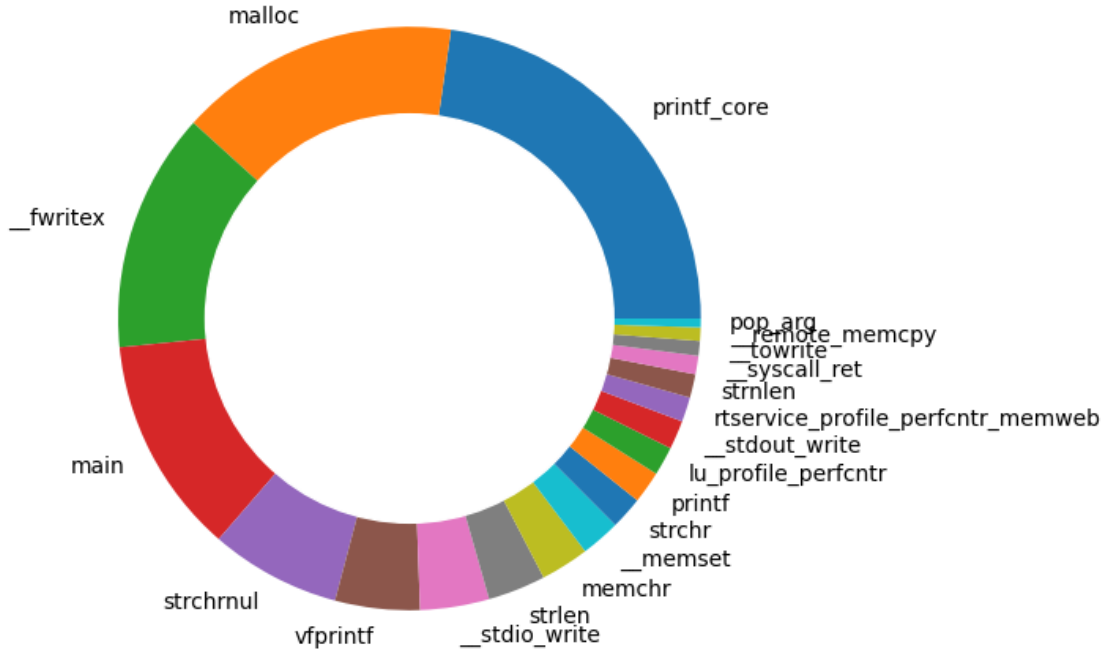



Memory Read Map
Source Node
Destination Node
0
1
0
1
300
250
200
150
100
50


Memory Write Map
Source Node
Destination Node
0
1
0
1
250
200
150
100
50


Atomic Transaction Map
Source Node
Destination Node
0
1
0
1
0
10
20
30
40
50


Remote Transaction Map
Source Node
Destination Node
0
1
0
1
0
1
2
3
4
5



Use the `emusim_profile` wrapper to generate these with a single command.
The directory `profile_hello-world` is where the outputs will be generated. The wrapper inputs are as follows:

```
emusim_profile <profile directory> [<emusim options>] -- mybenchmark.mwx --param 1 --param 2
```

Note: The profiler uses the following simulator flags, so they should not be passed into the profiler: `-o, --capture_timing_queues, --output_instruction_count`.

[5]:
```
%%bash
mkdir -p profile_hello-world;
emusim_profile profile_hello-world --total_nodes 2 -m 24 -- hello-world.mwx
```

```
Generating profile in profile_hello-world/hello-world
emusim.x  --total_nodes 2 -m 24
hello-world.mwx
Start untimed simulation with local date and time= Wed Sep 21 21:22:50 2022

Timed simulation starting…
Hello, world!
End untimed simulation with local date and time= Wed Sep 21 21:23:00 2022


Info: /OSCI/SystemC: Simulation stopped by user.
Generating profile_hello-world/hello-world_total_instructions.png
```

```
Generating profile_hello-world/hello-world_total_migrations.png
Generating profile_hello-world/hello-world.Thread_Enqueue_Map.png
Generating profile_hello-world/hello-world.Memory_Read_Map.png
Generating profile_hello-world/hello-world.Memory_Write_Map.png
Generating profile_hello-world/hello-world.Atomic_Transaction_Map.png
Generating profile_hello-world/hello-world.Remote_Transaction_Map.png
Generating profile_hello-world/hello-world.MSP_Activity.png
Generating profile_hello-world/hello-world.SRIO_Outgoing_Activity.png
Generating profile_hello-world/hello-world.SRIO_Incoming_Activity.png
Generating profile_hello-world/hello-world.Live_Threads.png
profile_hello-world/hello-world.hpc exists
Find all graphs in: profile_hello-world/hello-world_21-09-2022_21:23:31
The last hpc call to analyze will be 0
Program called lu_profile_perfcntr with message: HELLO WORLD STOPPING COUNTERS
AT END
Generating Graphs for [HELLO WORLD STOPPING COUNTERS AT END]…
Stopping here after read 0
hpc_file_name_base: hello-world.hpc
Report written to profile_hello-world/hello-world-report.html, you may open it
in your browser now


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        ALL RIGHTS RESERVED
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:121:
MatplotlibDeprecationWarning: Passing non-integers as three-element position
specification is deprecated since 3.3 and will be removed two minor releases
later.
  plt.subplot(subplotX, subplotY, subplotNum)  # place the graph in the correct
subplot in the figure
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. The bottom and top margins cannot be made large enough
to accommodate all axes decorations.
  plt.tight_layout()
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. tight_layout cannot make axes height small enough to
accommodate all axes decorations
  plt.tight_layout()
```
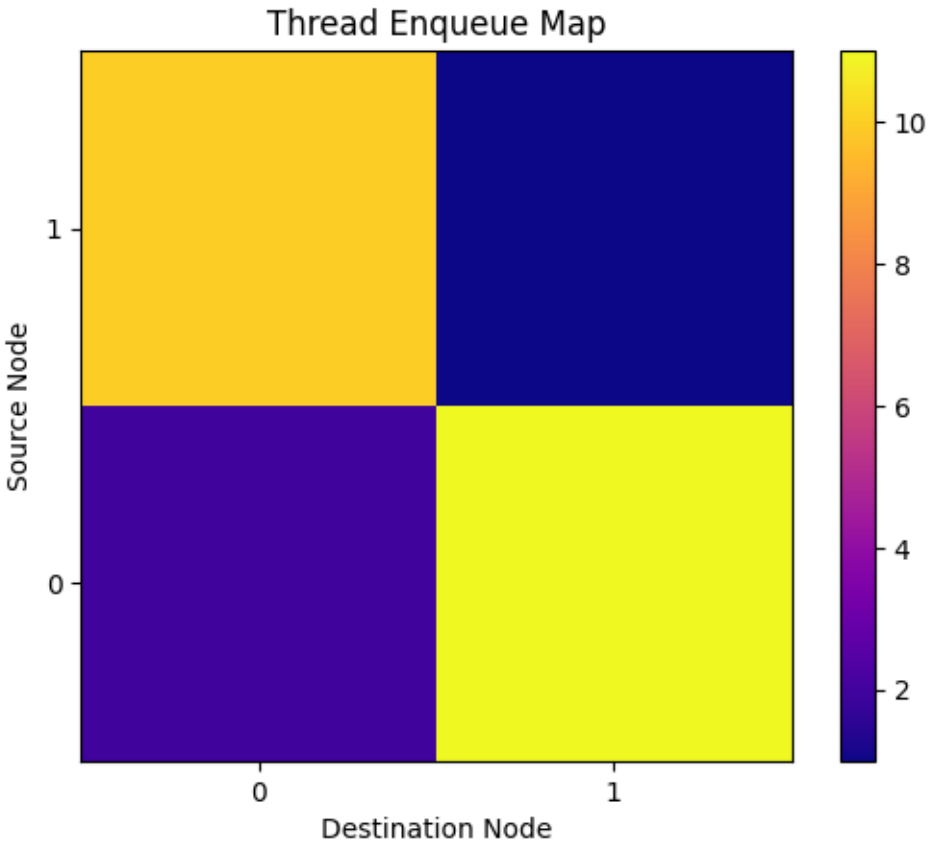
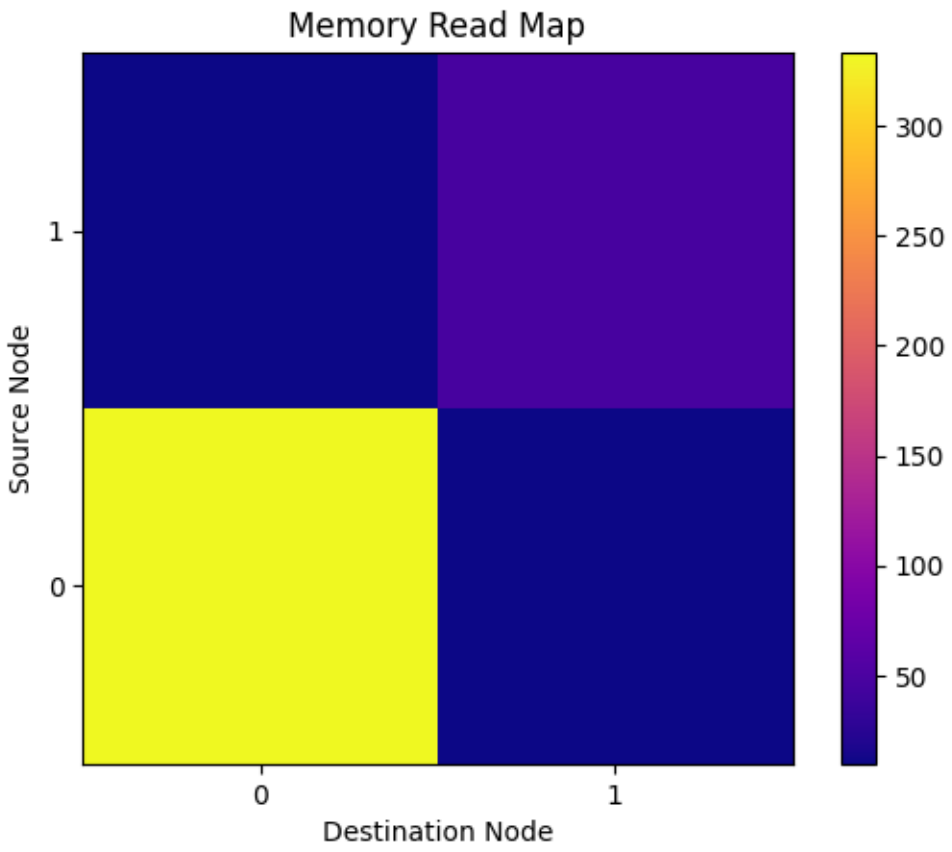
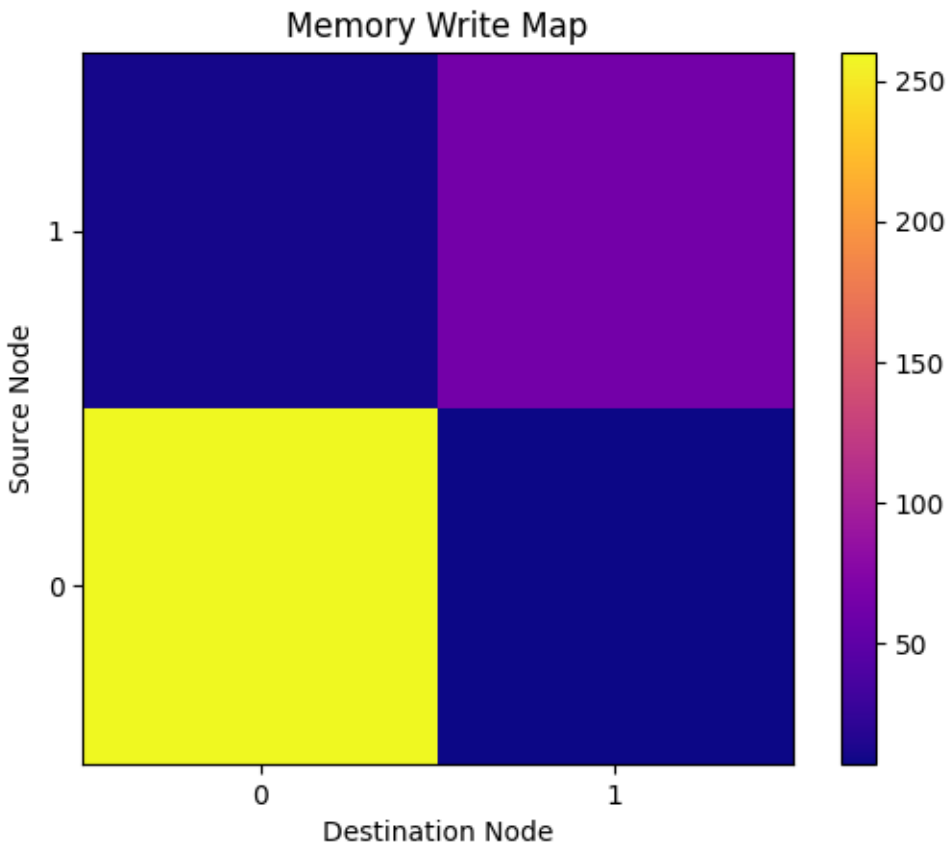
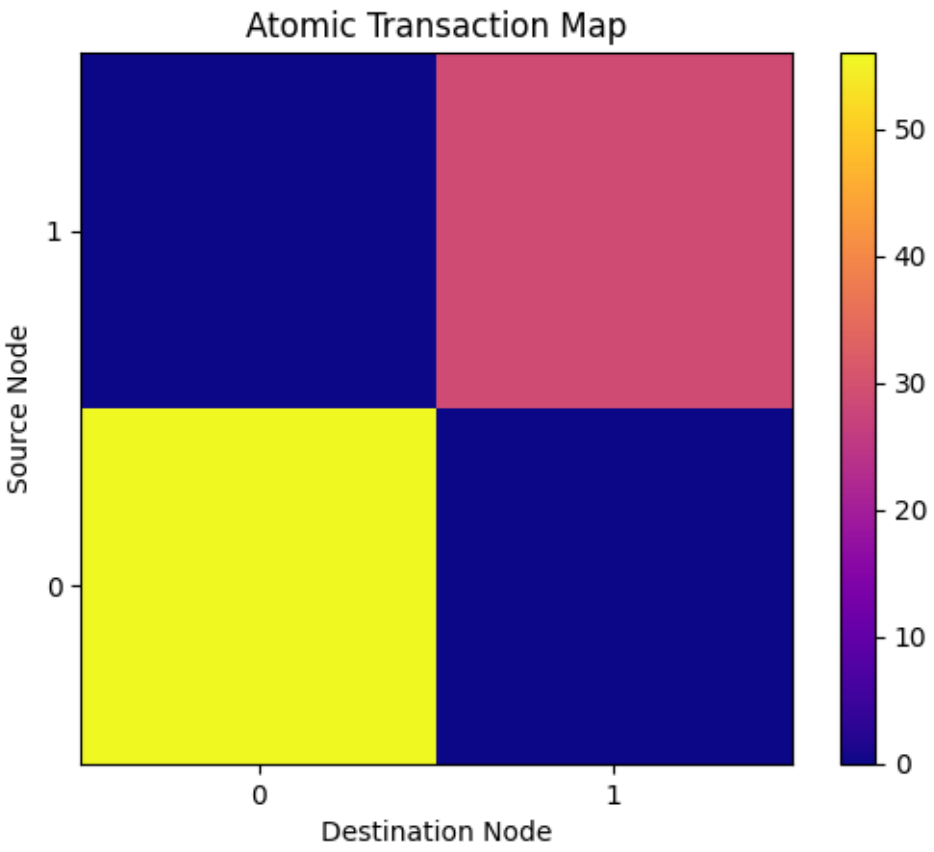

[6]:
```
display(Image(filename="profile_hello-world/hello-world.Thread_Enqueue_Map.
 ↪png"))
display(Image(filename="profile_hello-world/hello-world.Memory_Read_Map.png"))
display(Image(filename="profile_hello-world/hello-world.Memory_Write_Map.png"))
display(Image(filename="profile_hello-world/hello-world.Atomic_Transaction_Map.
 ↪png"))
display(Image(filename="profile_hello-world/hello-world.Remote_Transaction_Map.
 ↪png"))
```

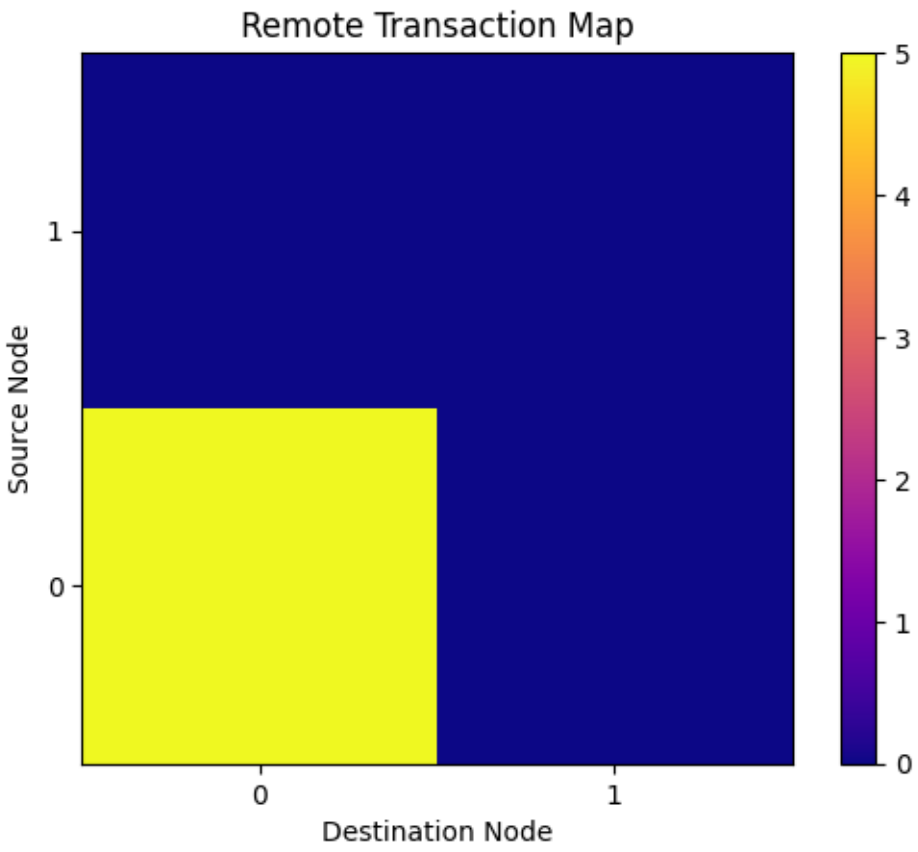
```
display(Image(filename="profile_hello-world/hello-world_total_instructions.
↪png"))
```

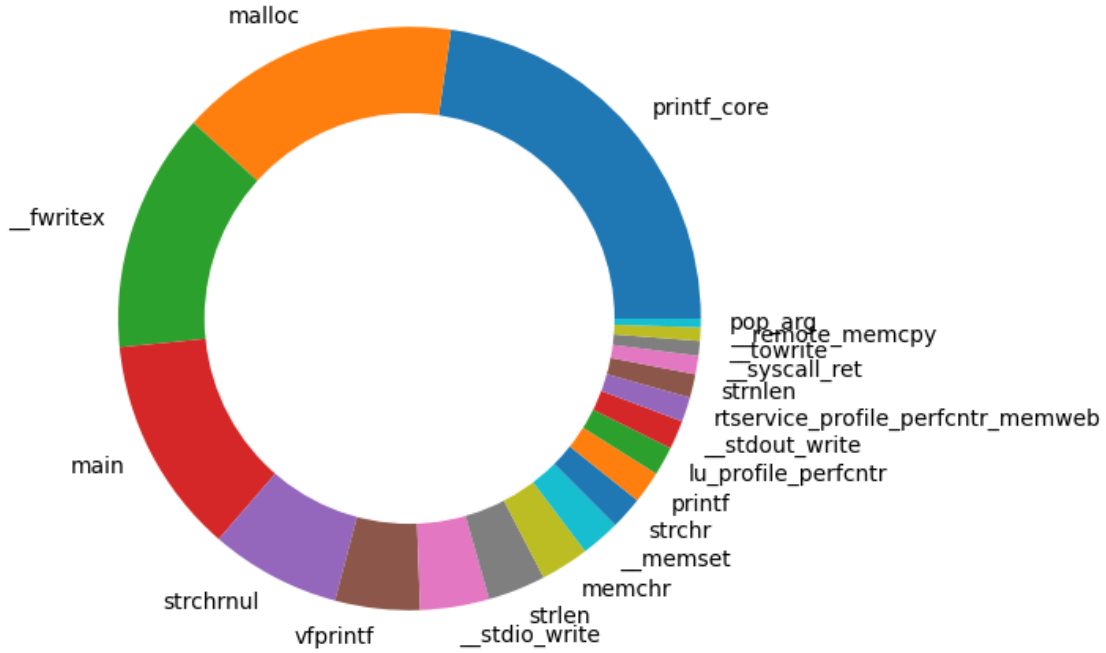



Memory Read Map
Source Node
Destination Node
0
1
0
1
300
250
200
150
100
50


Memory Write Map
Source Node
Destination Node
0
1
0
1
250
200
150
100
50


Atomic Transaction Map
Source Node
Destination Node
0
1
0
1
0
10
20
30
40
50


Remote Transaction Map
Source Node
Destination Node
0
1
0
1
0
1
2
3
4
5



[7]:
```
!ls hello-world.*
```

```
hello-world.c  hello-world.mwx
```

We now have several different output files. These are detailed in Ch. 7.6 of the Programming Guide and are as follows: * hello-world.mwx - Lucata executable. * hello-world.cdc - Configuration data output file; includes system information and wall-clock time. * hello-world.mps - Memory map output; shows memory operation types and thread enqueuing. * hello-world.tqd - Timed activity tracing; includes live threads, thread activity counts, and requests. * hello-world.uis - Instruction count statistics; shows the number of instructions per function in the application and number of migrations.

These files can be used with plotting tools to provide detailed output on the simulation of the application.

1.1 Hello World Spawn Example

That example kept one thread alive and migrating between nodelets. This one, hello-world-spawn.c, uses Cilk's thread spawning intrinsic:

```
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <cilk.h>
```

```
#include <memoryweb.h>
#include <timing.h>

const char str[] = "Hello, world!";

static inline void copy_ptr (char *pc, const long *pl) { *pc = (char)*pl; }

replicated long * ptr;
replicated char * str_out;

int main (void)
{
     long n = strlen (str) + 1;

     mw_replicated_init ((long*)&ptr, (long)mw_malloc1dlong (n));
     mw_replicated_init ((long*)&str_out, (long)malloc (n * sizeof (char)));

     /*
      * Start timing here.
      * Profiler settings hidden for simplicity.
      */

     for (long k = 0; k < n; ++k)
          ptr[k] = (long)str[k]; // Remote writes

     for (long k = 0; k < n; ++k)
          cilk_spawn copy_ptr (&str_out[k], &ptr[k]);

     cilk_sync;

     printf("%s\n", str_out);  // Migration back

     // Profiler end commands.

     return 0;
}
```

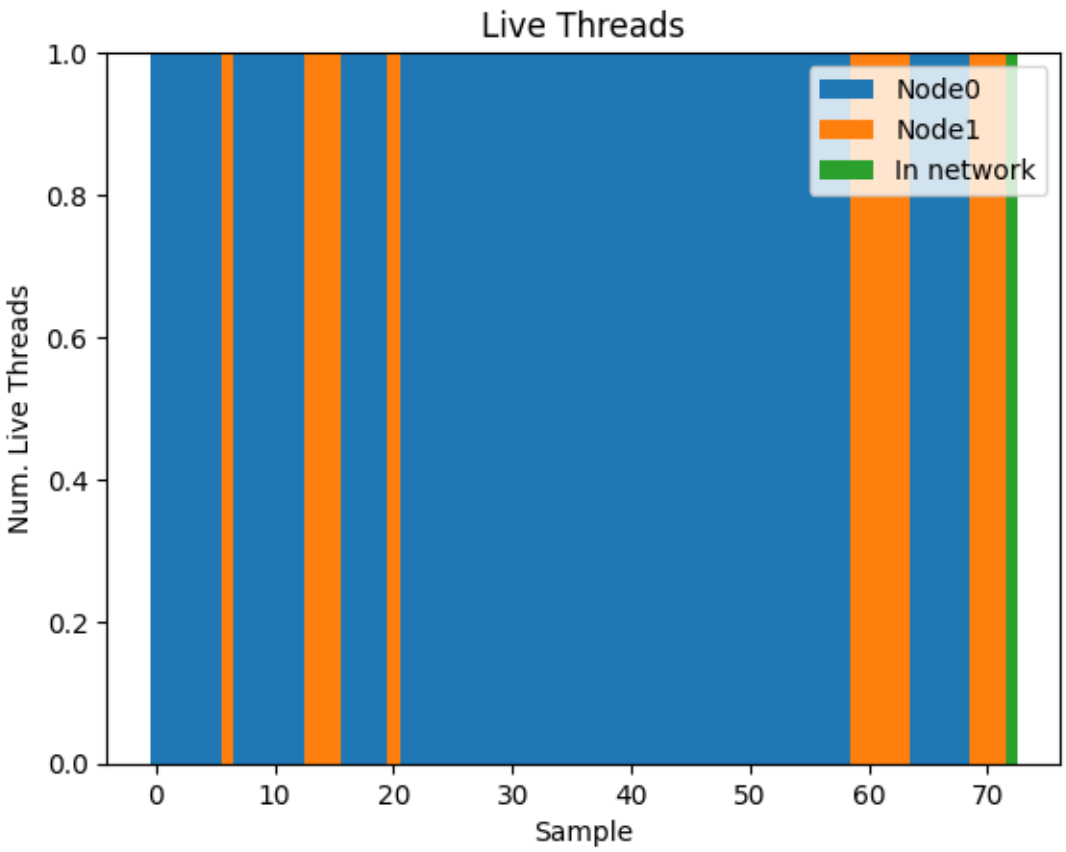
[8]:
```
%%bash
mkdir -p profile_hello-world-spawn;
emusim_profile profile_hello-world-spawn --total_nodes 2 -m 24 --␣
 ↪hello-world-spawn.mwx
ls profile_hello-world-spawn/hello-world-spawn*
```

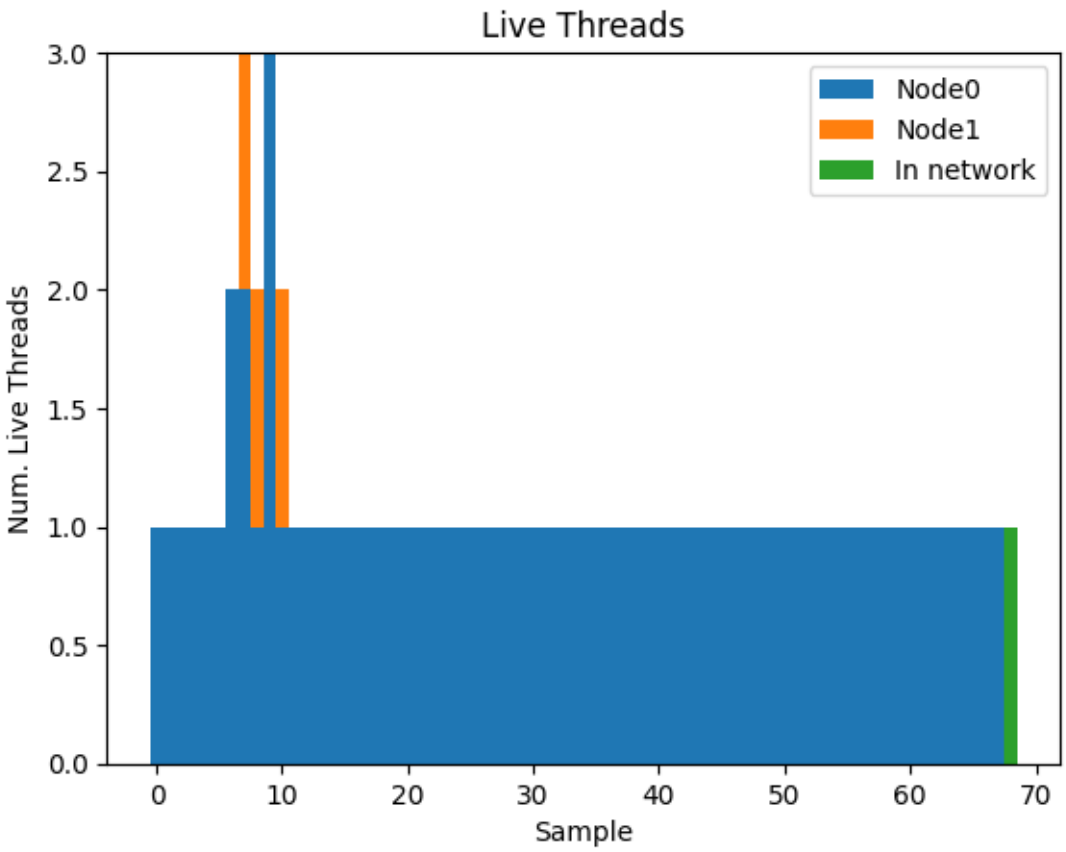
```
Generating profile in profile_hello-world-spawn/hello-world-spawn
emusim.x  --total_nodes 2 -m 24
hello-world-spawn.mwx
Start untimed simulation with local date and time= Wed Sep 21 21:24:16 2022
```

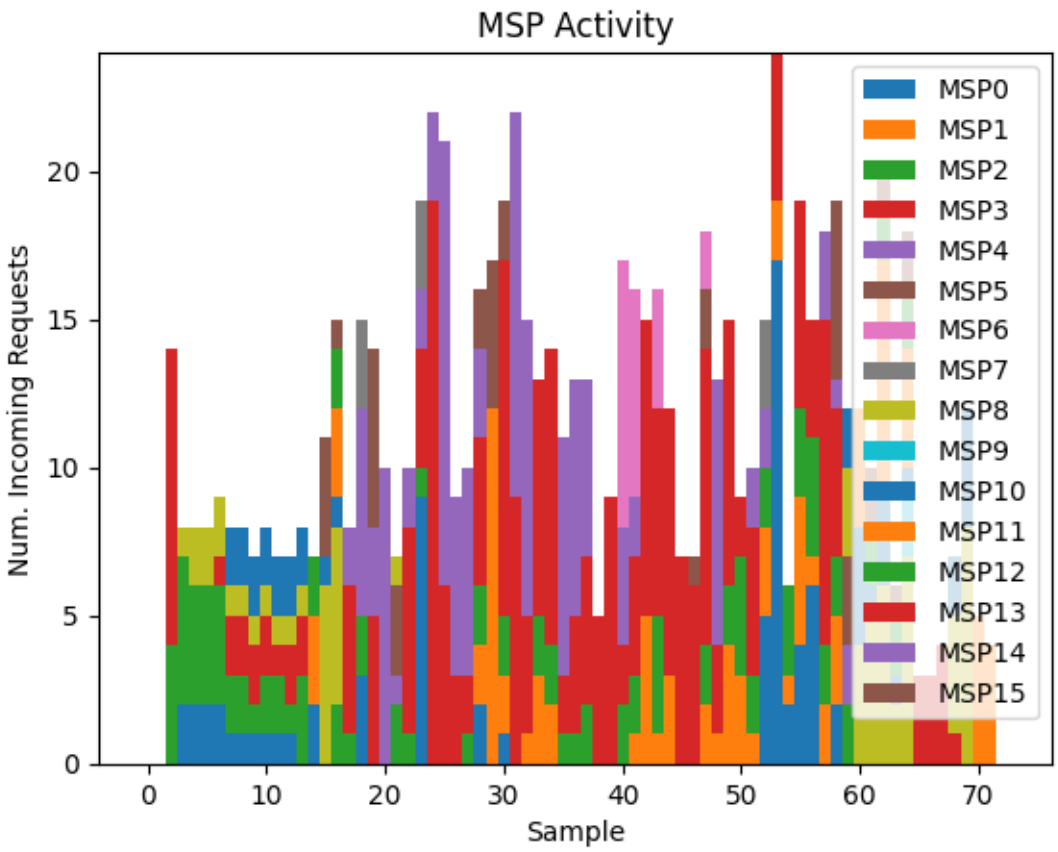
```
Timed simulation starting…
Hello, world!
End untimed simulation with local date and time= Wed Sep 21 21:24:27 2022


Info: /OSCI/SystemC: Simulation stopped by user.
Generating profile_hello-world-spawn/hello-world-spawn_total_instructions.png
Generating profile_hello-world-spawn/hello-world-spawn_total_migrations.png
Generating profile_hello-world-spawn/hello-world-spawn.Thread_Enqueue_Map.png
Generating profile_hello-world-spawn/hello-world-spawn.Memory_Read_Map.png
Generating profile_hello-world-spawn/hello-world-spawn.Memory_Write_Map.png
Generating profile_hello-world-spawn/hello-world-
spawn.Atomic_Transaction_Map.png
Generating profile_hello-world-spawn/hello-world-
spawn.Remote_Transaction_Map.png
Generating profile_hello-world-spawn/hello-world-spawn.MSP_Activity.png
Generating profile_hello-world-spawn/hello-world-
spawn.SRIO_Outgoing_Activity.png
Generating profile_hello-world-spawn/hello-world-
spawn.SRIO_Incoming_Activity.png
Generating profile_hello-world-spawn/hello-world-spawn.Live_Threads.png
profile_hello-world-spawn/hello-world-spawn.hpc exists
Find all graphs in: profile_hello-world-spawn/hello-world-
spawn_21-09-2022_21:24:51
The last hpc call to analyze will be 0
Program called lu_profile_perfcntr with message: HELLO WORLD SPAWN STOPPING
COUNTERS AT END
Generating Graphs for [HELLO WORLD SPAWN STOPPING COUNTERS AT END]…
Stopping here after read 0
hpc_file_name_base: hello-world-spawn.hpc
Report written to profile_hello-world-spawn/hello-world-spawn-report.html, you
may open it in your browser now
profile_hello-world-spawn/hello-world-spawn.Atomic_Transaction_Map.png
profile_hello-world-spawn/hello-world-spawn.cdc
profile_hello-world-spawn/hello-world-spawn.hpc
profile_hello-world-spawn/hello-world-spawn.Live_Threads.png
profile_hello-world-spawn/hello-world-spawn.mangled.uis
profile_hello-world-spawn/hello-world-spawn.Memory_Read_Map.png
profile_hello-world-spawn/hello-world-spawn.Memory_Write_Map.png
profile_hello-world-spawn/hello-world-spawn.mps
profile_hello-world-spawn/hello-world-spawn.MSP_Activity.png
profile_hello-world-spawn/hello-world-spawn_profile.csv
profile_hello-world-spawn/hello-world-spawn.Remote_Transaction_Map.png
profile_hello-world-spawn/hello-world-spawn-report.html
profile_hello-world-spawn/hello-world-spawn.SRIO_Incoming_Activity.png
profile_hello-world-spawn/hello-world-spawn.SRIO_Outgoing_Activity.png
profile_hello-world-spawn/hello-world-spawn.Thread_Enqueue_Map.png
```

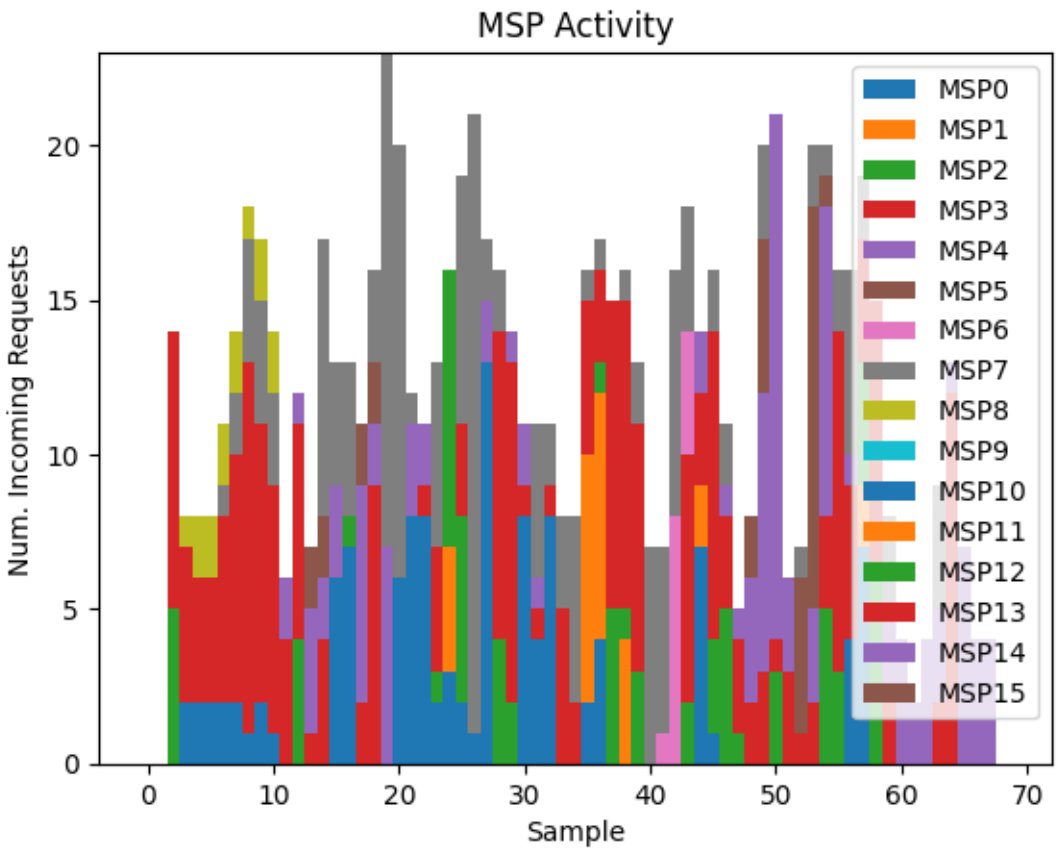
```
profile_hello-world-spawn/hello-world-spawn_total_instructions.png
profile_hello-world-spawn/hello-world-spawn_total_migrations.png
profile_hello-world-spawn/hello-world-spawn.tqd
profile_hello-world-spawn/hello-world-spawn.uis

profile_hello-world-spawn/hello-world-spawn_21-09-2022_21:24:51:
hello-world-spawn.hpc.csv
HELLO_WORLD_SPAWN_STOPPING_COUNTERS_AT_END


        SystemC 2.3.3-Accellera --- Sep  7 2022 09:15:59
        Copyright (c) 1996-2018 by all Contributors,
        ALL RIGHTS RESERVED
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:121:
MatplotlibDeprecationWarning: Passing non-integers as three-element position
specification is deprecated since 3.3 and will be removed two minor releases
later.
  plt.subplot(subplotX, subplotY, subplotNum)  # place the graph in the correct
subplot in the figure
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. tight_layout cannot make axes height small enough to
accommodate all axes decorations
  plt.tight_layout()
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. The bottom and top margins cannot be made large enough
to accommodate all axes decorations.
  plt.tight_layout()
```

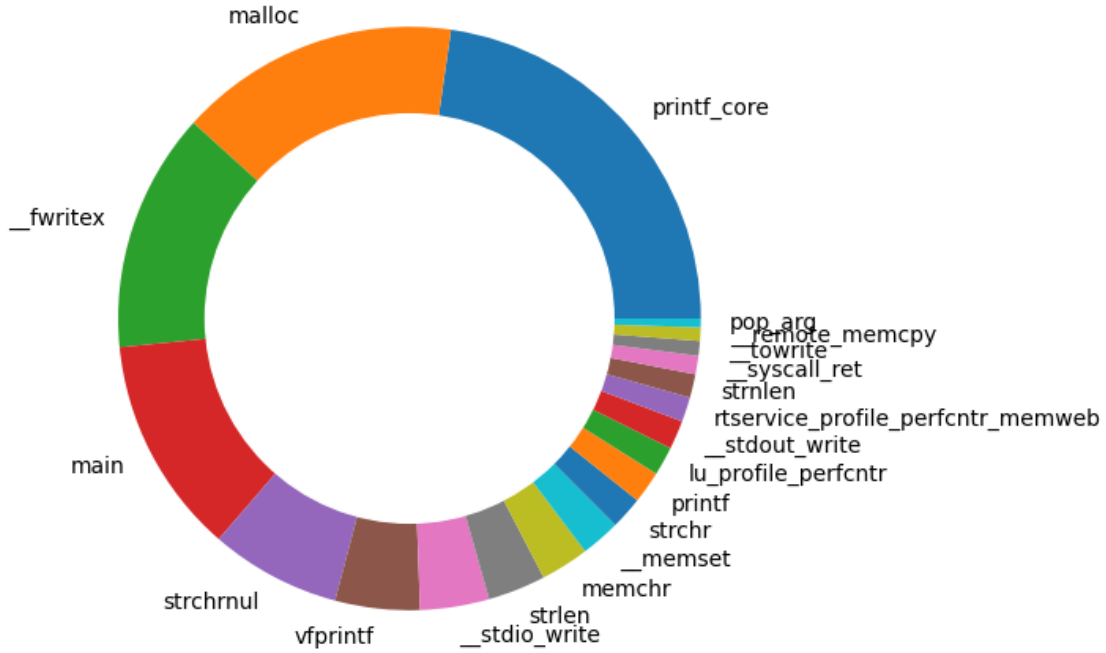
[9]:
```
display(Image(filename="profile_hello-world/hello-world.Live_Threads.png"))
display(Image(filename="profile_hello-world-spawn/hello-world-spawn.
 ↪Live_Threads.png"))
#display(Image(filename="profile_hello-world/hello-world.Thread_Activity.png"))
#display(Image(filename="profile_hello-world-spawn/hello-world-spawn.
 ↪Thread_Activity.png"))
display(Image(filename="profile_hello-world/hello-world.MSP_Activity.png"))
display(Image(filename="profile_hello-world-spawn/hello-world-spawn.
 ↪MSP_Activity.png"))
display(Image(filename="profile_hello-world/hello-world_total_instructions.
 ↪png"))
display(Image(filename="profile_hello-world-spawn/
 ↪hello-world-spawn_total_instructions.png"))
```

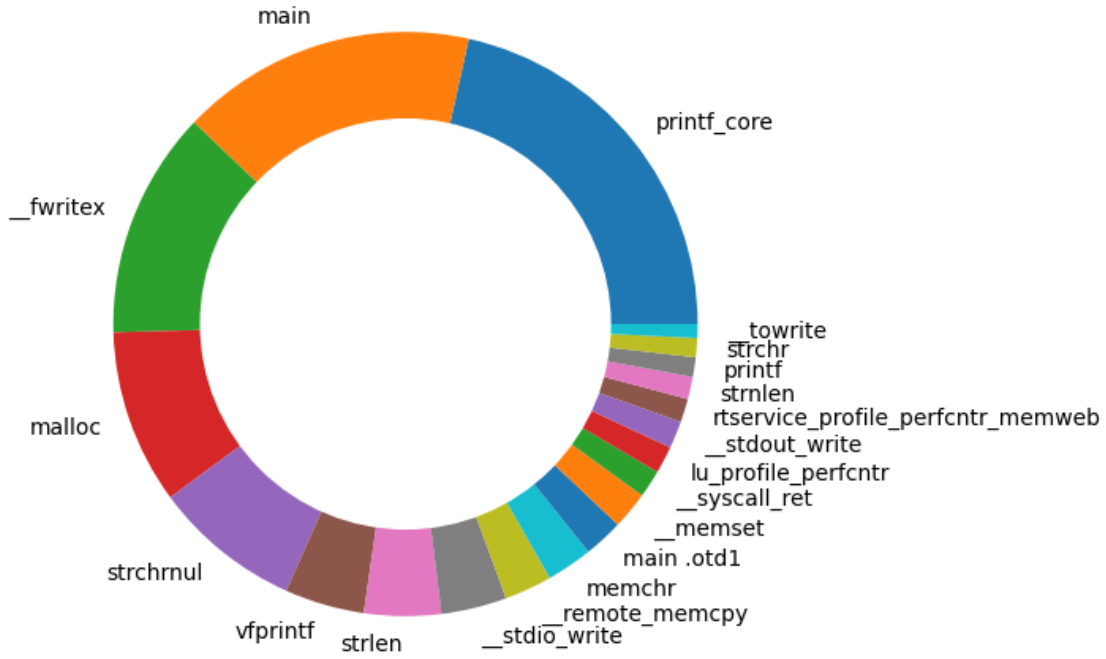

Live Threads
Node0
Node1
In network
Num. Live Threads
Sample
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
60
70


Live Threads
Node0
Node1
In network
Num. Live Threads
Sample
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
10
20
30
40
50
60
70


MSP Activity
Num. Incoming Requests
Sample
0
5
10
15
20
0
10
20
30
40
50
60
70
MSP0
MSP1
MSP2
MSP3
MSP4
MSP5
MSP6
MSP7
MSP8
MSP9
MSP10
MSP11
MSP12
MSP13
MSP14
MSP15


MSP Activity
Num. Incoming Requests
Sample
0
5
10
15
20
0
10
20
30
40
50
60
70
MSP0
MSP1
MSP2
MSP3
MSP4
MSP5
MSP6
MSP7
MSP8
MSP9
MSP10
MSP11
MSP12
MSP13
MSP14
MSP15


malloc
printf_core
__fwritex
pop_arg
__remote_memcpy
__towrite
__syscall_ret
strnlen
rtservice_profile_perfcntr_memweb
__stdout_write
lu_profile_perfcntr
printf
strchr
__memset
memchr
strlen
__stdio_write
vfprintf
strchrnul
main


main
printf_core
__fwritex
__towrite
strchr
printf
strnlen
rtservice_profile_perfcntr_memweb
__stdout_write
lu_profile_perfcntr
__syscall_ret
__memset
main .otd1
memchr
__remote_memcpy
__stdio_write
strlen
vfprintf
strchrnul
malloc

Then we can compare the output of the normal Hello World and the Spawn Hello World for the statistics that are different.

1.2 Advanced Implementation - Spawn At

This example just shows one additional variation of using a `cilk_spawn_at` call to spawn threads at a remote node

```
#include <stdlib.h>
#include <stdio.h>
#include <string.h>
#include <cilk.h>

#include <memoryweb.h>
#include <timing.h>

static const char str[] = "Hello, world!";

static inline void copy_ptr (char *pc, const long *pl) { *pc = (char)*pl; }

replicated long * ptr;
replicated char * str_out;

int main (void)
{
     long n = strlen (str) + 1;

     mw_replicated_init ((long*)&ptr, (long)mw_malloc1dlong (n));
     mw_replicated_init ((long*)&str_out, (long)malloc (n * sizeof (char)));

     /*
      * Start timing here.
      * Profiler settings hidden for simplicity.
      */

     for (long k = 0; k < n; ++k)
          ptr[k] = (long)str[k]; // Remote writes

     for (long k = 0; k < n; ++k) {
          cilk_spawn_at(&ptr[k]) copy_ptr (&str_out[k], &ptr[k]);
     }

     cilk_sync;

     printf("%s\n", str_out);  // Migration back

     // Profiler end commands.
```

```
    return 0;
}
```

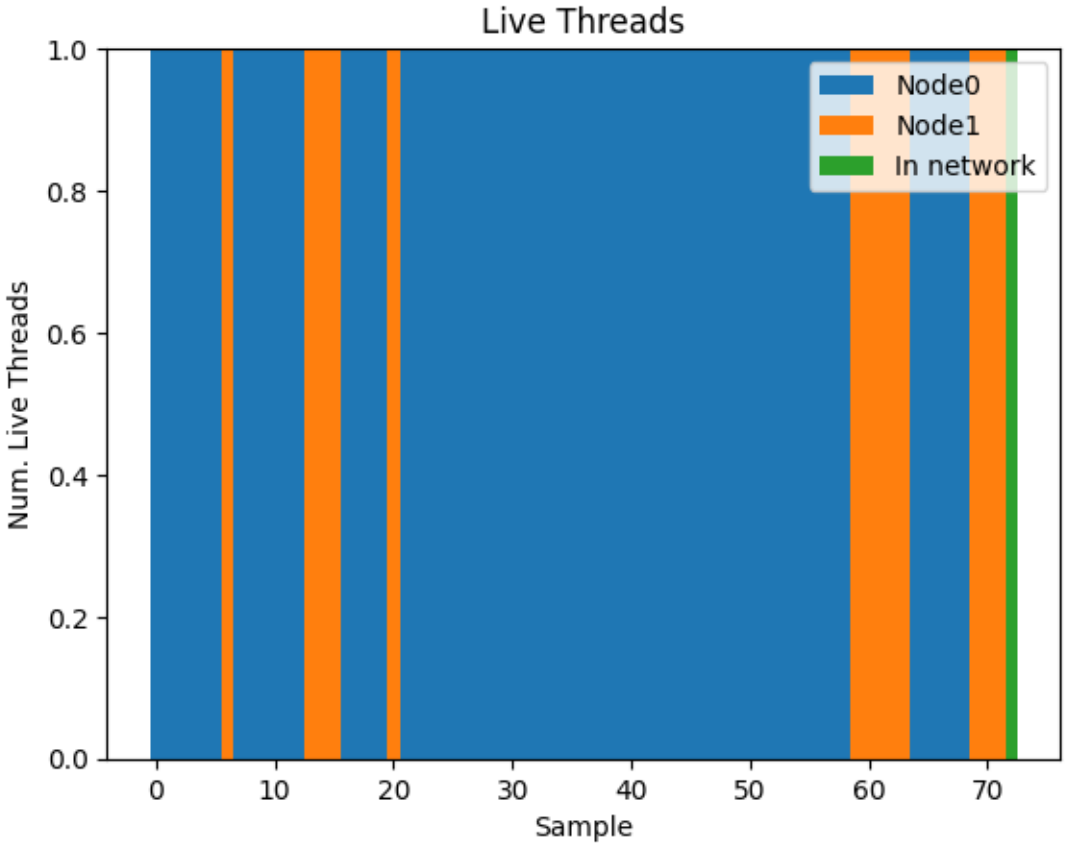
[10]:
```
%%bash
mkdir -p profile_hello-world-spawn-at;
emusim_profile profile_hello-world-spawn-at --total_nodes 2 -m 24 --␣
 ↪hello-world-spawn-at.mwx
ls profile_hello-world-spawn-at/hello-world-spawn-at*
```

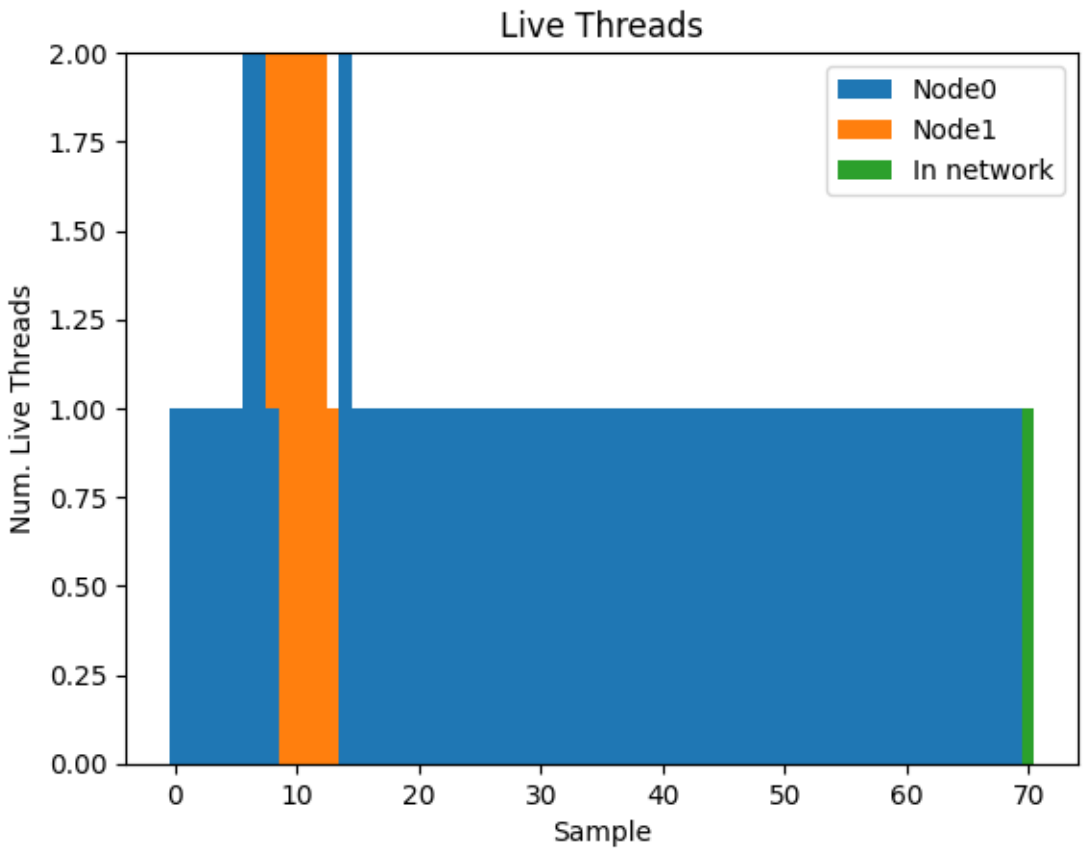
```
Generating profile in profile_hello-world-spawn-at/hello-world-spawn-at
emusim.x  --total_nodes 2 -m 24
hello-world-spawn-at.mwx
Start untimed simulation with local date and time= Wed Sep 21 21:25:35 2022

Timed simulation starting…
Hello, world!
End untimed simulation with local date and time= Wed Sep 21 21:25:47 2022


Info: /OSCI/SystemC: Simulation stopped by user.
Generating profile_hello-world-spawn-at/hello-world-spawn-
at_total_instructions.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at_total_migrations.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.Thread_Enqueue_Map.png
Generating profile_hello-world-spawn-at/hello-world-spawn-at.Memory_Read_Map.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.Memory_Write_Map.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.Atomic_Transaction_Map.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.Remote_Transaction_Map.png
Generating profile_hello-world-spawn-at/hello-world-spawn-at.MSP_Activity.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.SRIO_Outgoing_Activity.png
Generating profile_hello-world-spawn-at/hello-world-spawn-
at.SRIO_Incoming_Activity.png
Generating profile_hello-world-spawn-at/hello-world-spawn-at.Live_Threads.png
profile_hello-world-spawn-at/hello-world-spawn-at.hpc exists
Find all graphs in: profile_hello-world-spawn-at/hello-world-spawn-
at_21-09-2022_21:26:11
The last hpc call to analyze will be 0
Program called lu_profile_perfcntr with message: HELLO WORLD SPAWN AT STOPPING
COUNTERS AT END
Generating Graphs for [HELLO WORLD SPAWN AT STOPPING COUNTERS AT END]…
Stopping here after read 0
```

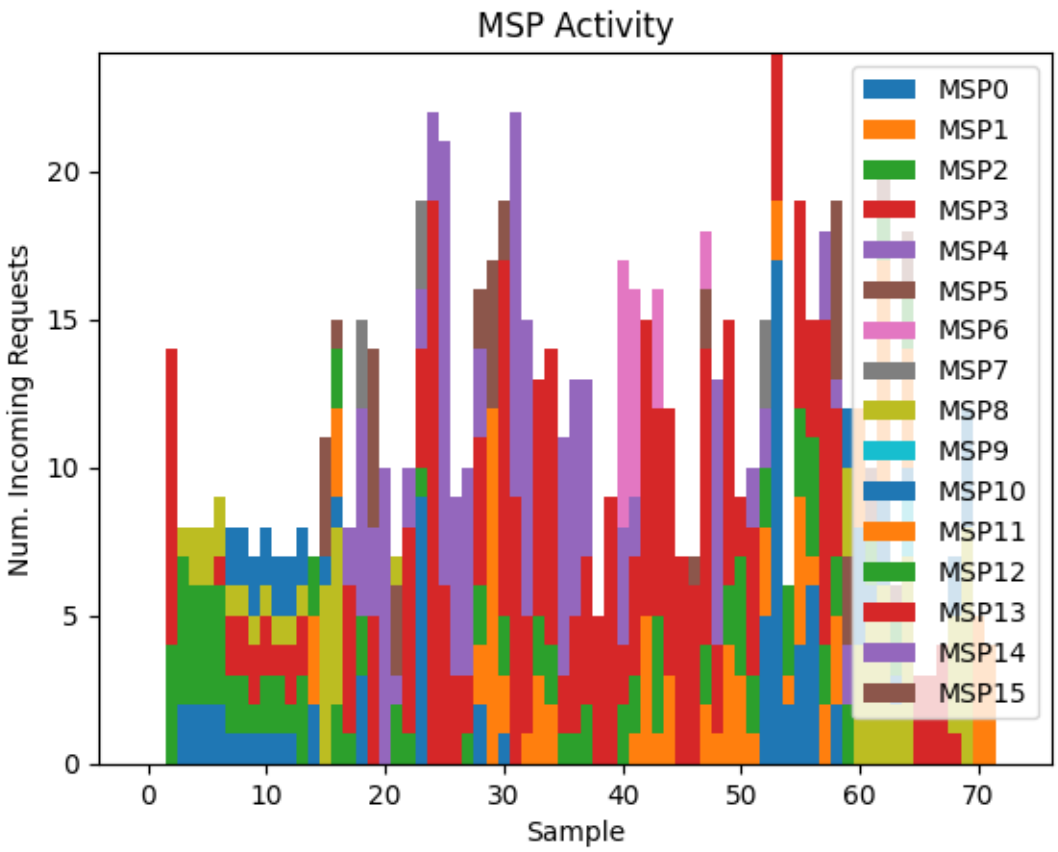
```
hpc_file_name_base: hello-world-spawn-at.hpc
Report written to profile_hello-world-spawn-at/hello-world-spawn-at-report.html,
you may open it in your browser now
profile_hello-world-spawn-at/hello-world-spawn-at.Atomic_Transaction_Map.png
profile_hello-world-spawn-at/hello-world-spawn-at.cdc
profile_hello-world-spawn-at/hello-world-spawn-at.hpc
profile_hello-world-spawn-at/hello-world-spawn-at.Live_Threads.png
profile_hello-world-spawn-at/hello-world-spawn-at.mangled.uis
profile_hello-world-spawn-at/hello-world-spawn-at.Memory_Read_Map.png
profile_hello-world-spawn-at/hello-world-spawn-at.Memory_Write_Map.png
profile_hello-world-spawn-at/hello-world-spawn-at.mps
profile_hello-world-spawn-at/hello-world-spawn-at.MSP_Activity.png
profile_hello-world-spawn-at/hello-world-spawn-at_profile.csv
profile_hello-world-spawn-at/hello-world-spawn-at.Remote_Transaction_Map.png
profile_hello-world-spawn-at/hello-world-spawn-at-report.html
profile_hello-world-spawn-at/hello-world-spawn-at.SRIO_Incoming_Activity.png
profile_hello-world-spawn-at/hello-world-spawn-at.SRIO_Outgoing_Activity.png
profile_hello-world-spawn-at/hello-world-spawn-at.Thread_Enqueue_Map.png
profile_hello-world-spawn-at/hello-world-spawn-at_total_instructions.png
profile_hello-world-spawn-at/hello-world-spawn-at_total_migrations.png
profile_hello-world-spawn-at/hello-world-spawn-at.tqd
profile_hello-world-spawn-at/hello-world-spawn-at.uis

profile_hello-world-spawn-at/hello-world-spawn-at_21-09-2022_21:26:11:
hello-world-spawn-at.hpc.csv
HELLO_WORLD_SPAWN_AT_STOPPING_COUNTERS_AT_END


        SystemC 2.3.3-Accellera --- Sep  7 2022 09:15:59
        Copyright (c) 1996-2018 by all Contributors,
        ALL RIGHTS RESERVED
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:121:
MatplotlibDeprecationWarning: Passing non-integers as three-element position
specification is deprecated since 3.3 and will be removed two minor releases
later.
  plt.subplot(subplotX, subplotY, subplotNum)  # place the graph in the correct
subplot in the figure
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. tight_layout cannot make axes height small enough to
accommodate all axes decorations
  plt.tight_layout()
/net/tools/emu/pathfinder-sw/22.09-beta/bin/make_hpc_plots.py:177: UserWarning:
Tight layout not applied. The bottom and top margins cannot be made large enough
to accommodate all axes decorations.
  plt.tight_layout()
```

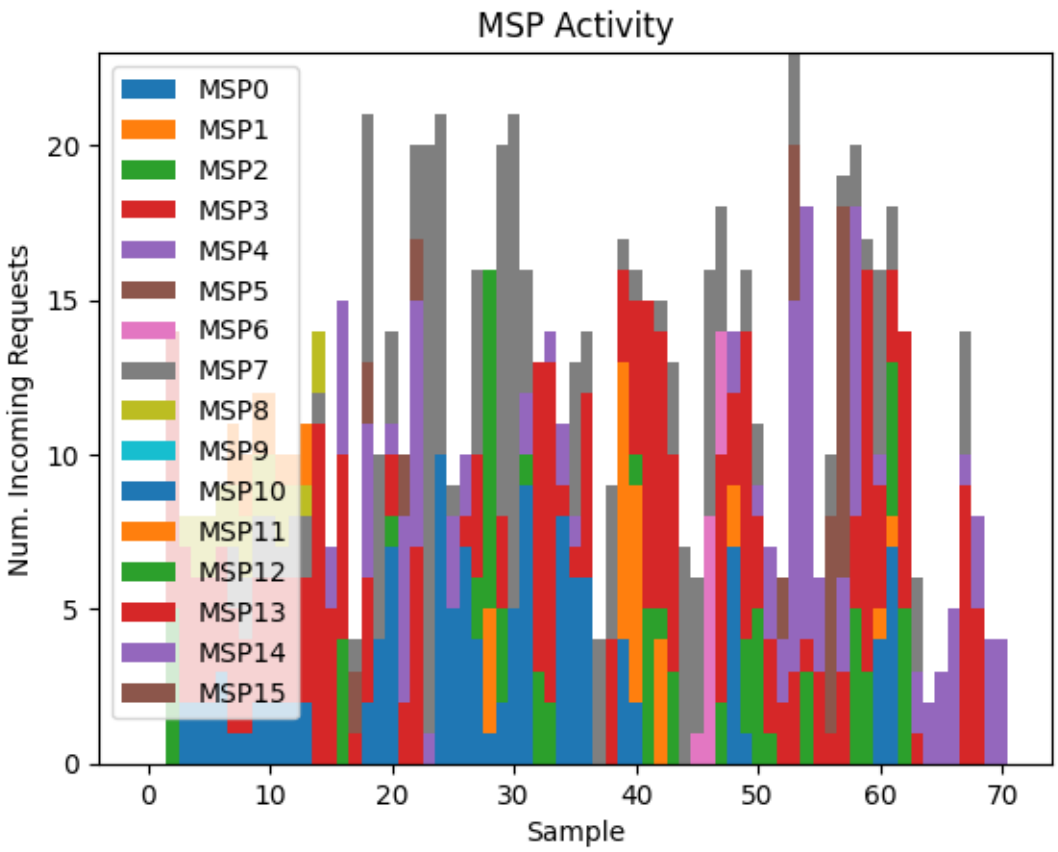
[11]:
```
display(Image(filename="profile_hello-world/hello-world.Live_Threads.png"))
```

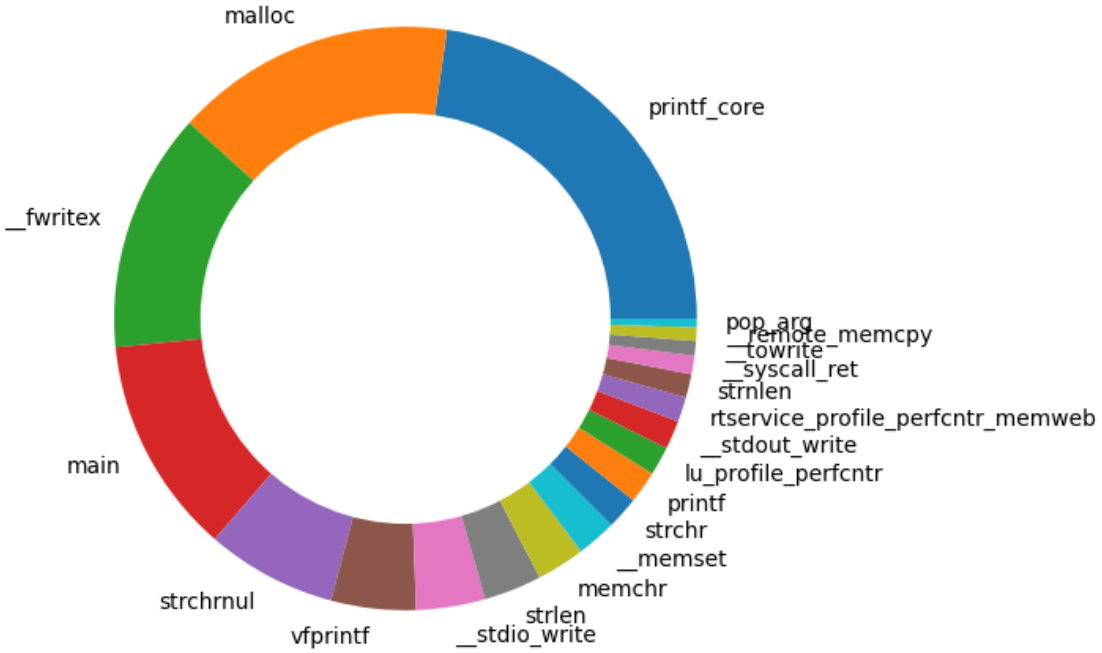
```
display(Image(filename="profile_hello-world-spawn-at/hello-world-spawn-at.
 ↪Live_Threads.png"))
#display(Image(filename="profile_hello-world/hello-world.Thread_Activity.png"))
#display(Image(filename="profile_hello-world-spawn-at/hello-world-spawn-at.
 ↪Thread_Activity.png"))
display(Image(filename="profile_hello-world/hello-world.MSP_Activity.png"))
display(Image(filename="profile_hello-world-spawn-at/hello-world-spawn-at.
 ↪MSP_Activity.png"))
display(Image(filename="profile_hello-world/hello-world_total_instructions.
 ↪png"))
display(Image(filename="profile_hello-world-spawn-at/
 ↪hello-world-spawn-at_total_instructions.png"))
```

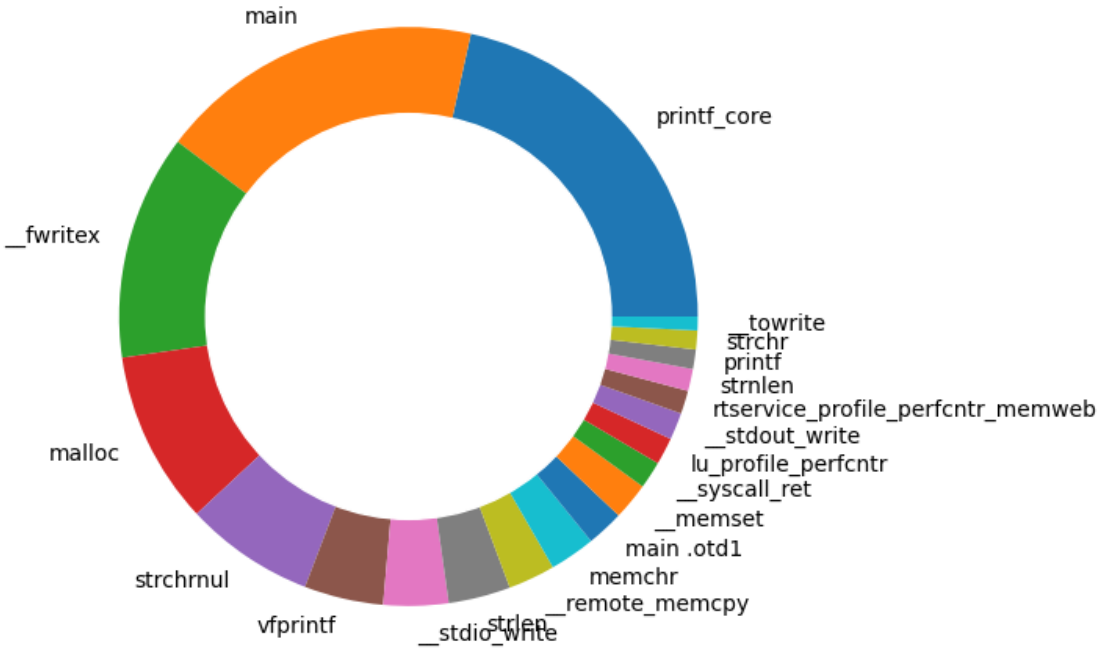



Live Threads
Num. Live Threads
Sample
Node0
Node1
In network
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0
10
20
30
40
50
60
70


MSP Activity
Num. Incoming Requests
Sample
0
5
10
15
20
0
10
20
30
40
50
60
70
MSP0
MSP1
MSP2
MSP3
MSP4
MSP5
MSP6
MSP7
MSP8
MSP9
MSP10
MSP11
MSP12
MSP13
MSP14
MSP15


MSP Activity
MSP0
MSP1
MSP2
MSP3
MSP4
MSP5
MSP6
MSP7
MSP8
MSP9
MSP10
MSP11
MSP12
MSP13
MSP14
MSP15
Num. Incoming Requests
0
5
10
15
20
0
10
20
30
40
50
60
70
Sample


malloc
printf_core
__fwritex
pop_arg
__remote_memcpy
__towrite
__syscall_ret
strnlen
rtservice_profile_perfcntr_memweb
__stdout_write
lu_profile_perfcntr
printf
strchr
__memset
memchr
strlen
__stdio_write
vfprintf
strchrnul
main


main
printf_core
__fwritex
__towrite
strchr
printf
strnlen
rtservice_profile_perfcntr_memweb
__stdout_write
lu_profile_perfcntr
__syscall_ret
__memset
main .otd1
memchr
__remote_memcpy
strlen
__stdio_write
vfprintf
strchrnul
malloc

Once we've finished our testing, we can then clean up some of the logfiles that we used for this example.

[12]:
```
!make clean
```

```
rm -f *.mwx *.tqd *.cdc *.vsf *.mps *.uis *.csv *.hpc; \
./helpers/backup_imgs.sh
```