

IoT: Client Devices

Static v. Dynamic Details

Libraries

STATIC LIBRARIES

- ▶ .a suffix, contains object (.o) files, archived with **ar**
- ▶ Linked into program at *compile time*

DYNAMIC LIBRARIES

- ▶ .so (for *shared object*) suffix
- ▶ Linked into program at *execution* by the *loader*

Static Linking

LEADS TO LARGE EXECUTABLES

- ▶ All the code is in the executable file

NO CODE REUSE

- ▶ All used functions must be in same file
- ▶ `printf(.)` code is in all files that print

LOTS OF WASTED SPACE

- ▶ We only need to store this code in a single place

```
cclamb@ubuntu:~/Work/iot-client $ arm-linux-gnueabi-nm test-print-s > nm_s.out
cclamb@ubuntu:~/Work/iot-client $ arm-linux-gnueabi-nm test-print-d > nm_d.out
cclamb@ubuntu:~/Work/iot-client $ ls -alh nm_*.out
-rw-rw-r-- 1 cclamb cclamb 971 Jan 26 17:27 nm_d.out
-rw-rw-r-- 1 cclamb cclamb 19K Jan 26 17:27 nm_s.out
cclamb@ubuntu:~/Work/iot-client $ arm-linux-gnueabi-nm test-print-d | grep puts
      U puts
cclamb@ubuntu:~/Work/iot-client $ arm-linux-gnueabi-nm test-print-s | grep puts
00010688 T fputs_unlocked
00010688 T __GI_fputs_unlocked
00010254 T puts
cclamb@ubuntu:~/Work/iot-client $
```

Comparing

Note the **U** and **T**

```
cclamb@ubuntu:~/Work/iot-client $ head nm_s_t.out
00010858 T abort
0001f8f8 T __adddf3
000201c8 T __aeabi_cdcmpeq
000201c8 T __aeabi_cdcmpge
000201ac T __aeabi_cdrcmpeq
00020240 T __aeabi_d2uiz
0001f8f8 T __aeabi_dadd
000201dc T __aeabi_dcmpeq
00020218 T __aeabi_dcmpge
0002022c T __aeabi_dcmpgt
cclamb@ubuntu:~/Work/iot-client $ grep fopen nm_s_t.out
00019adc T fopen
00019adc T __GI_fopen
00019d84 T _stdio_fopen
cclamb@ubuntu:~/Work/iot-client $
```

Statically Linked

Statically linked executable contains *lots* of code, very little of which is used