

Debuggers and Multi-Language Support Exercises

CS 364 — Spring 2022

1 Definitions

1. Define the following terms, and give examples where appropriate.

(a) Application Kernel:

(b) Breakpoint:

(c) Conditional Breakpoint:

(d) Debugger:

(e) Debugging Table:

(f) Marshalling:

(g) Signal:

(h) Watchpoint:

3 Multi-Language Projects

1. What are some of the reasons why a software project might contain multiple programming languages? At what point is a multi-language project advantageous? When is a multi-language project detrimental?
2. List and describe at least three (3) uses for the JNIEnv pointer provided as the first argument to JNI C functions.
3. Compare and contrast the JNI and Python's ctypes module. In particular, consider the examples from class and the relative length of both C implementations. Why is the C implementation for Python so much shorter than the implementation for Java?
4. *Checksums* are often used to validate data transmitted over a network. CRC32 is a common algorithm for computing a checksum. An implementation is provided here: <https://web.mit.edu/freebsd/head/sys/libkern/crc32.c> Download this file and replace line 49 (`#include <sys/system.h>`) with `#include <stdint.h>`. Do not add to or modify this file in any other way. Write programs in both Python and Java that call `calculate_crc32c` (the last function in the file). Pass in 0 as the initial CRC32 value (the first argument).