**CSE 221: Homework 1**

**Winter 2022**

**Due Thursday, January 27 at 11:59pm**

Answer the following questions. For questions asking for short answers, there may not necessarily be a "right" answer, although some answers may be more compelling and/or much easier to justify. But I am interested in your explanation (the "why") as much as the answer itself. Also, do not use shorthand: write your answers using complete sentences.

When grading homeworks, we will grade one question in detail and assign full credit for technical answers to the others.

Submit your homework by uploading it to Gradescope (we will post the entry code on Piazza).

1. A fundamental aspect of protection in operating systems is rights amplification. Rights amplification enables a more privileged protection domain to perform an operation on behalf of a less privileged protection domain in a controlled fashion without violating protection in the system. For each of the following operating systems, state (a) the protection domain that they support, (b) the mechanism for crossing protection domains, (c) how rights are represented, (d) how rights are amplified crossing domains, and (e) how the OS determines whether to allow the domain crossing.
   * Hydra
   * Multics
   * Pilot

Support your answers with a bit of explanation, such as a concise summary explanation in your own words (a quote of a phrase or sentence from the papers is fine as well). For instance, two possible answers to part (a) for Hydra are:

A protection domain in Hydra is the "local name space" (LNS). An LNS represents the current set of objects and rights to which a process has access, and those objects and rights change when a process moves from one LNS to another.

A protection domain in Hydra is the "local name space" (LNS): "At any instant, the execution environment (domain) of a program is defined by an LNS