

A3 Overview

Blitz Kernel

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- Assignments 3 through 7 involve implementing components of a small OS, Blitz OS.
- This project spans multiple assignments with specific deadlines to stay on track.
- In Assignment 3, implement three kernel monitors: ThreadManager, ProcessManager, and FrameManager.

Assignment Structure and Files

- Develop on the main branch in a directory named os.
- Do not create an "a3" directory; only create the "a3" branch after completing the assignment.
- Download provided files and add them to the main branch in the "os" directory.
- Do not commit executables or unnecessary files like .o and .s files unless specified.

Kernel Package Structure

- The Kernel package combines previous Thread and Synch packages, now with additional files for future assignments.
- Relevant classes in `Kernel.k` include:
 - Thread scheduler functions, Semaphore, Mutex, Condition, Thread, ThreadManager, ProcessControlBlock, ProcessManager, FrameManager, AddrSpace, TimerInterruptHandler.

Execution and Testing

- The `makefile` builds an executable called "os," run by the Blitz emulator.
- The `Main.k` file initializes the kernel and runs testing functions.
- Modify `Main.k` for testing but use the provided version for the final run. Avoid committing changes to `Main.k`.

Implementation Details

- Implement unimplemented methods for ThreadManager, ProcessManager, and FrameManager.
- Other unimplemented methods will be addressed in later assignments.
- The BitMap package is available for use but should not be modified.

Implementing ThreadManager

- **Modify ThreadManager class** by implementing the following methods:
 - Init
 - GetANewThread
 - FreeThread
- **Memory Allocation and Management**
 - No dynamic memory allocation (heap) in the kernel.
 - All Thread objects created at startup and managed through a fixed pool (e.g., 10 threads).
 - Use MAX_NUMBER_OF_PROCESSES (10) to define the thread pool size.
- **ThreadManager has:**
 - threadTable: an array for Thread objects.
 - freeList: a list to track available Thread objects.

A3 Summary

- **Task 1: Threads and the ThreadManager (35 points):**
 - Modify the **ThreadManager** class.
 - Implement methods: **Init**, **GetANewThread**, and **FreeThread**.
 - Ensure proper allocation and deallocation of **Thread** objects.
- **Task 2: Processes and the ProcessManager (35 points):**
 - Modify the **ProcessManager** class.
 - Implement methods: **Init**, **GetANewProcess**, and **FreeProcess**.
 - Manage **ProcessControlBlock** objects and ensure proper allocation and deallocation.
- **Task 3: The Frame Manager (50 points):**
 - Modify the **FrameManager** class.
 - Implement methods: **PutAFrame**, **GetANewFrame**, **GetNewFrames**, and **ReturnAllFrames**.