There are two major parts to the CPU scheduling simulator: the simulator itself, and the statistics module.

The statistics module accumulates statistical data from the simulator and when the simulator is finished outputs the statistical information to file.

The simulator contains the simulator parts: a job creator, a clock, and a processor. The simulator has the main ticking loop, which increments the clock, seeks jobs from the job generator, hands them to the processor, and runs the processor for the tick.

The clock contains a counter of how many ticks have gone by and its pointer is passed to the processor and job generator.

The job generator contains a discrete generator for calculating the probabilities for when to create jobs of a certain type and service time.

Jobs themselves contain data about their service time length, their type, their job ID and their creation or CPU queue entry time. There are two types of jobs which inherit from an abstract class: I/O-bound jobs and CPU-bound jobs. They are differentiated by an int identifier. The two types are only differentiated by the statistics module and any of the CPU objects in the processor.

The processor controls the CPU(s) and the waiting job queue. At the beginning of it’s portion of the simulation loop, the processor will check each CPU at the beginning of its processing loop and insert jobs from the waiting jobs queue into any available CPU job queue before processing for that CPU begins.

The CPU(s) will process their queue of jobs in time slices according to the job type for each clock cycle. There will be no more than 5 jobs in its internal job queue.

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| Stat Module | none | none |
| Responsibilities | Collaborators |  |
| -get statistics data | -Sim Engine: Get data from here |  |
| -analyze and print data |  |  |

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| --- | --- | --- |
| Sim Engine | none | none |
| Responsibilities | Collaborators |  |
| -Simulate CPU scheduling |  |  |
| -Runs system loop  -clock  -job generator  -processor |  |  |

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| --- | --- | --- |
| Clock | none | none |
| Responsibilities | Collaborators |  |
| -contains time value | -Job Generator:gets time for job generation |  |
| -increments time | -processor: gets time for queue time and job destruction |  |
| -serves time for timestamps | -stat module: send time when incremented |  |

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| --- | --- | --- |
| Job Generator | none | none |
| Responsibilities | Collaborators |  |
| -Creates new jobs | -Clock: gets timestamps |  |
| -read in statistical job generation info | -Processor: sends jobs here |  |
| -keeps job ID counter |  |  |

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| Discrete Generator | none | none |
| Responsibilities | Collaborators |  |
| -generate a random number based on probability |  |  |
| -distribution of discrete array of numbers 0 through (SIZE-1) |  |  |

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| --- | --- | --- |
| Job | none | IOJob, CPUJob |
| Responsibilities | Collaborators |  |
| -hold data for one job | -Job Generator: created with attributes here |  |
|  | -Processor - processed and destroyed here |  |

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| IOJob | Job | none |
| Responsibilities | Collaborators |  |
| -Represent I/O-bound job |  |  |

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| --- | --- | --- |
| CPUJob | Job | none |
| Responsibilities | Collaborators |  |
| -Represent CPU-bound job |  |  |

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| Processor | none | none |
| Responsibilities | Collaborators |  |
| -hold CPU(s) and runs them | -Job Generator: Gets jobs from there |  |
| -holds waiting jobs, enqueues them from Job Generator, and enqueues them into CPU job queues when available | -stat generator: send job waiting queue time |  |

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| --- | --- | --- |
| CPU | none | none |
| Responsibilities | Collaborators |  |
| -holds and processes job queue | -Sim Engine: Get data from here |  |
| -analyze and print data | -stat module: send Job EOL data  -CPU time  -broken down with:  -type  -service time  -also CPU idle time for each cycle |  |

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| Queue | none | none |
| Responsibilities | Collaborators |  |
| -ADT template containing queue structure |  |  |