# A comparative study of multi-threading systems: `pthreads`, `openCilk` and `multiCilk`

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## Brief description

The project's goal is to make comparisons, in functionalities, ease of use and performance, of three multi-threading systems,

- ◇ `pthreads`: with the support of condition variables, without the support of `openCilk`-like run-time working stealing (user programs manage load balancing),
- ◇ `openCilk`: with system-initiated, run-time work-stealing, without the support of `pthread`-like condition variables (user programs manage producer-consumer pipelining),
- ◇ `multiCilk`: with the support of both condition variables and working-stealing.

**Objectives.** The participants will get familiar with and gain experience with

- ◇ the aforementioned multi-threading systems;
- ◇ benchmarking studies, using relevant tasks, algorithms and datasets;
- ◇ performance measure by elapsed time;
- ◇ system-specific programming, leveraging each system as best as possible,
  - – if there are readily available programs, cite the sources;
  - – if existing programs are modified, cite the sources and specify the changes;
- ◇ characterization of common and distinctive system features.

**Deliverables:**

- ◇ Clean, modular-structured, documented working codes, and
- ◇ A brief written report of the comparative study, including citation of data and information sources.
- ◇ (Optional.) Visualized summary or summaries in terms of maps, plots or tables across (i) benchmarking cases and (ii) multi-threading systems. See the figure below as a reference frame.