
# Energumen

French Funded project

2018-2022

# Partners

- Principal Investigator : LIG Grenoble
- IRIT, Toulouse
- LIP6, Paris

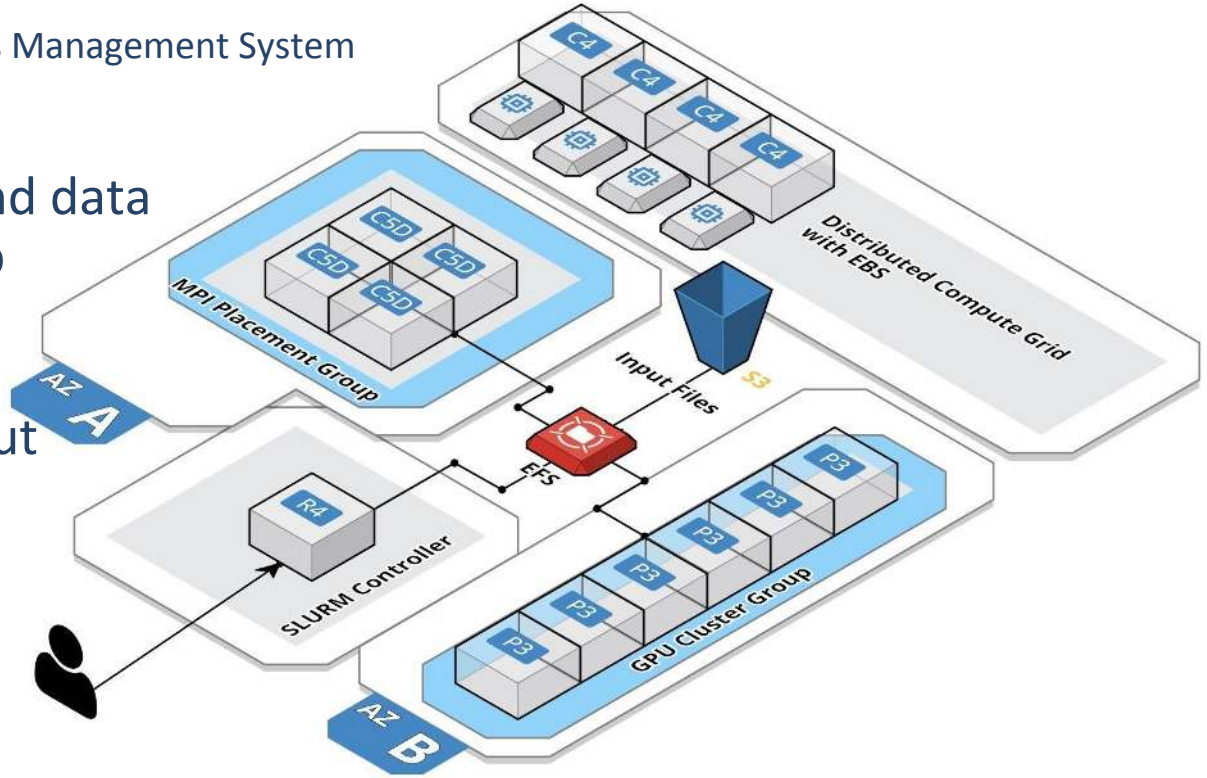
External collaborators

- University of Luxembourg
- TUM, Munich, Germany
- Toulouse Super-computing center CALMIP
- Grenoble HPC center : CIMENT

# Classical RJMS

Resources and Jobs Management System

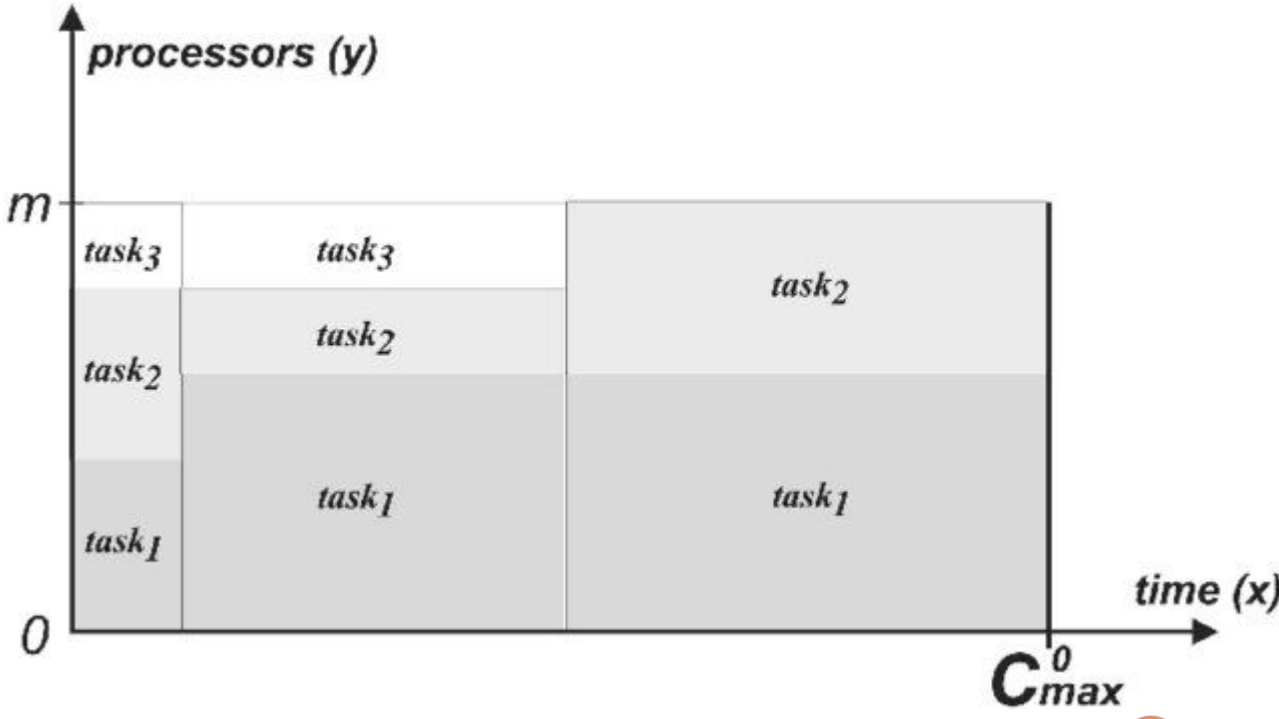
1. User sends jobs and data
2. RJMS schedule job
3. Job starts
4. Job finishes
5. User obtains output



# Malleable tasks

New capability:

- Change resource allocation
  - At starting time
  - During execution



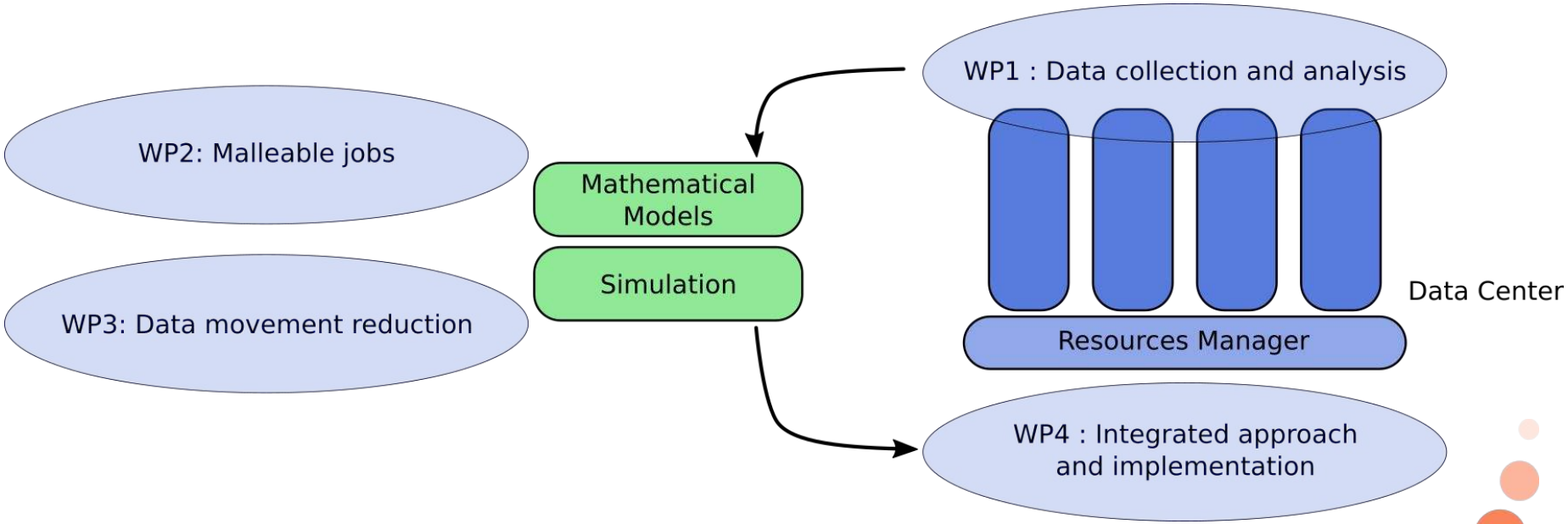
# Energumen

Disruptive RJMS for large scale systems

Challenges

1. Collect the most relevant data for energy.
2. Dynamic redimensioning of parallel jobs.
3. Reduce data movements to save energy.
4. Transferability.

# Structure of Energumen



# Current contributions@IRIT

Focus on Scheduling

1. Creating malleable MPI applications
2. Modeling malleable application
3. First scheduling proposals
   a. Theoretical proof of optimality
   b. Complexity evaluation

4. Use of BatSim (based on CloudSim)
   a. Scheduler
   b. Results can be directly ported in SLURM/OAR

```
int GetCount(int n, int v[])
{
    int total_count = 0;
    int count = 0;
    int id;          // process id, i.e. "r
    int p;           // number of concurren
    int low, high;   // this rank's partiti

    MPI_Comm_rank(MPI_COMM_WORLD, &id);
    MPI_Comm_size(MPI_COMM_WORLD, &p);

    low = id*(n-1)/p;
    high = (id+1)*(n-1)/p;

    for (int i = low; i < high; i++)
    {
        count += v[i];
    }

    if (p > 1)
        MPI_Reduce(&count, &total_count, 1
    else
        total_count = count;

    return total_count;
}
```