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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | Number of Tasks: 8  Cores per Task: 1 | | |  |  | Number of Tasks: 8  Cores per Task: 1 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-8  julia myscript.jl $SLURM\_ARRAY\_TASK\_ID | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-8  python myscript.py $SLURM\_ARRAY\_TASK\_ID | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | Number of Tasks: 4  Cores per Task: 1 | | |  |  | Number of Tasks: 4  Cores per Task: 1 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  julia myscript.jl $SLURM\_ARRAY\_TASK\_ID | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  python myscript.py $SLURM\_ARRAY\_TASK\_ID | | |  |
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|  | LLMapReduce (Map Step) | | |  |  | LLMapReduce (Reduce Step) | | |  |
|  | Number of Tasks: 4  Cores per Task: 1 | | |  |  | Number of Tasks: 1  Cores per Task: 1  **Dependency on map step completion** | | |  |
|  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 | | |  |  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 | | |  |
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|  | LLMapReduce (Map Step) | | |  |  | LLMapReduce (Reduce Step) | | |  |
|  | Number of Tasks: 4  Cores per Task: 1 | | |  |  | Number of Tasks: 1  Cores per Task: 1  **Dependency on map step completion** | | |  |
|  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 | | |  |  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 | | |  |
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|  | LLMapReduce (Map Step) | | |  |  | LLMapReduce (Reduce Step) | | |  |
|  | Number of Tasks: 8  Cores per Task: 1 | | |  |  | Number of Tasks: 1  Cores per Task: 1  **Dependency on map step completion** | | |  |
|  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=8 | | |  |  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=8 | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77209\_1 77209 13:53 normal 1 R node-126  77209\_2 77209 13:53 normal 1 R node-126  77209\_3 77209 13:53 normal 1 R node-059  77209\_4 77209 13:53 normal 1 R node-058  77209\_5 77209 13:53 normal 1 R node-058… | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77217\_1 77217 15:53 normal 1 R node-056  77217\_2 77217 15:53 normal 1 R node-056  77217\_3 77217 15:59 normal 1 R node-058  77217\_4 77217 15:59 normal 1 R node-058  77217\_5 77217 16:04 normal 1 R node-058… | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77214\_1 77214 22:5 normal 1 R node-057  77214\_2 77214 22:35 normal 1 R node-057  77214\_3 77214 22:35 normal 1 R node-057  77214\_4 77214 22:35 normal 1 R node-058 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77216\_1 77216 18:23 normal 1 R node-057  77216\_2 77216 18:23 normal 1 R node-057  77216\_3 77216 18:23 normal 1 R node-057  77216\_4 77216 18:23 normal 1 R node-058 | | |  |
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|  | LLMapReduce (Reduce Step) | | |  |  | LLMapReduce (Map Step) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77534 77546 15:26 normal 1 R node-056 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77546 77546 N/A normal 1 PD (Dependency)  77545\_1 77545 15:20 normal 1 R node-037  77545\_2 77545 15:20 normal 1 R node-037  77545\_3 77545 15:20 normal 1 R node-037  77545\_4 77545 15:20 normal 1 R node-038 | | |  |
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|  | LLMapReduce (Reduce Step) | | |  |  | LLMapReduce (Map Step) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77536 77536 15:26 normal 1 R node-056 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77536 77536 N/A normal 1 PD (Dependency)  77535\_1 77535 15:20 normal 1 R node-037  77535\_2 77535 15:20 normal 1 R node-037  77535\_3 77535 15:20 normal 1 R node-037  77535\_4 77535 15:20 normal 1 R node-038 | | |  |
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|  | LLMapReduce (Reduce Step) | | |  |  | LLMapReduce (Map Step) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77525 77525 18:14 normal 1 R node-064 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77535 77525 N/A normal 1 PD (Dependency)  77524\_1 77524 15:09 normal 1 R node-027  77524\_2 77524 15:09 normal 1 R node-027  77524\_3 77524 15:09 normal 1 R node-027  77524\_4 77524 18:09 normal 1 R node-028… | | |  |
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|  | Shared Memory | | |  |  | Shared Memory | | |  |
|  | Number of Tasks: 1  Cores per Task: 4 | | |  |  | Number of Tasks: 1  Cores per Task: 4 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -N 1  #SBATCH -c 4  python myscript.py | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -N 1  #SBATCH -c 4  export OMP\_NUM\_THREADS=$SLURM\_CPUS\_PER\_TASK  ./my\_OpenMP\_code | | |  |
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|  | Shared Memory | | |  |  | Shared Memory | | |  |
|  | Number of Tasks: 1  Cores per Task: 8 | | |  |  | Number of Tasks: 1  Cores per Task: 8 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -N 1  #SBATCH -c 8  python myscript.py | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -N 1  #SBATCH -c 8  export OMP\_NUM\_THREADS=$SLURM\_CPUS\_PER\_TASK  ./my\_OpenMP\_code | | |  |
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|  | Distributed Memory | | |  |  | Distributed Memory | | |  |
|  | Number of Tasks: 4  Cores per Task: 1 | | |  |  | Number of Tasks: 4  Cores per Task: 1 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 4  mpirun ./my\_MPI\_code | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 4  julia myscript.jl | | |  |
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|  | Distributed Memory | | |  |  | Distributed Memory | | |  |
|  | Number of Tasks: 8  Cores per Task: 1 | | |  |  | Number of Tasks: 8  Cores per Task: 1 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 8  mpirun ./my\_MPI\_code | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 8  julia myscript.jl | | |  |
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|  | GPU Job | | |  |  | GPU Job | | |  |
|  | Number of Tasks: 1, GPUs: 1  Cores per Task: 14 | | |  |  | Number of Tasks: 1, GPUs: 1  Cores per Task: 14 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 1  #SBATCH -c 14  #SBATCH -p gpu  #SBATCH --gres=gpu:volta:1  python my\_ML\_job.py | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 1  #SBATCH -c 14  #SBATCH -p gpu  #SBATCH --gres=gpu:volta:1  python my\_ML\_job.py | | |  |
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|  | Shared Memory | | |  |  | Shared Memory | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77206 77206 14:58 normal 4 R node-012 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77202 77202 18:06 normal 4 R node-082 | | |  |
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|  | Shared Memory | | |  |  | Shared Memory | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77126 77126 11:23 normal 8 R node-062 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77156 77156 06:16 normal 8 R node-054 | | |  |
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|  | Distributed Memory | | |  |  | Distributed Memory | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77595 77595 22:23 normal 4 R node-071 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77568 77568 13:53 normal 4 R node-094 | | |  |
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|  | Distributed Memory | | |  |  | Distributed Memory | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77652 77652 10:26 normal 8 R node-042 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77685 77685 17:22 normal 8 R node-053 | | |  |
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|  | GPU Job | | |  |  | GPU Job | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  75647 75647 09:14 gpu 14 R gpu-02 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  75635 75635 13:48 gpu 14 R gpu-01 | | |  |
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|  | LLMapReduce (Map Step) | | |  |  | LLMapReduce (Reduce Step) | | |  |
|  | Number of Tasks: 4  Cores per Task: 2 | | |  |  | Number of Tasks: 1  Cores per Task: 1  **Dependency on map step completion** | | |  |
|  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 --slotsPerTask=2 | | |  |  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 --slotsPerTask=2 | | |  |
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|  | LLMapReduce (Map Step) | | |  |  | LLMapReduce (Reduce Step) | | |  |
|  | Number of Tasks: 4  Cores per Task: 2 | | |  |  | Number of Tasks: 1  Cores per Task: 1  **Dependency on map step completion** | | |  |
|  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 --slotsPerTask=2 | | |  |  | LLMapReduce --mapper mapper.sh --reducer reducer.sh --input myfiles --output myoutput --np=4 --slotsPerTask=2 | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | Number of Tasks: 4  Cores per Task: 2 | | |  |  | Number of Tasks: 4  Cores per Task: 2 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  #SBATCH -c 2  julia myscript.jl $SLURM\_ARRAY\_TASK\_ID | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  #SBATCH -c 2  python myscript.py $SLURM\_ARRAY\_TASK\_ID | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | Number of Tasks: 4  Cores per Task: 2 | | |  |  | Number of Tasks: 4  Cores per Task: 2 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  #SBATCH -c 2  julia myscript.jl $SLURM\_ARRAY\_TASK\_ID | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j-%a  #SBATCH -a 1-4  #SBATCH -c 2  python myscript.py $SLURM\_ARRAY\_TASK\_ID | | |  |
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|  | GPU Job | | |  |  | GPU Job | | |  |
|  | Number of Tasks: 1, GPUs: 1  Cores per Task: 14 | | |  |  | Number of Tasks: 1, GPUs: 1  Cores per Task: 14 | | |  |
|  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 1  #SBATCH -c 14  #SBATCH -p gpu  #SBATCH --gres=gpu:volta:1  python my\_ML\_job.py | | |  |  | #!/bin/bash  #SBATCH -o out.log-%j  #SBATCH -n 1  #SBATCH -c 14  #SBATCH -p gpu  #SBATCH --gres=gpu:volta:1  python my\_ML\_job.py | | |  |

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|  | LLMapReduce (Reduce Step) | | |  |  | LLMapReduce (Map Step) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77637 77637 15:26 normal 1 R node-056 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77637 77537 N/A normal 1 PD (Dependency)  77636\_1 77636 15:20 normal 2 R node-037  77636\_2 77636 15:20 normal 2 R node-037  77636\_3 77636 15:20 normal 2 R node-037  77636\_4 77636 15:20 normal 2 R node-038 | | |  |
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|  | LLMapReduce (Reduce Step) | | |  |  | LLMapReduce (Map Step) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77430 77430 15:26 normal 1 R node-056 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77430 77430 N/A normal 1 PD (Dependency)  77429\_1 77429 15:20 normal 2 R node-037  77429\_2 77429 15:20 normal 2 R node-037  77429\_3 77429 15:20 normal 2 R node-037  77429\_4 77429 15:20 normal 2 R node-038 | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77247\_1 77247 09:25 normal 2 R node-047  77247\_2 77247 09:25 normal 2 R node-047  77247\_3 77247 09:25 normal 2 R node-047  77247\_4 77247 09:25 normal 2 R node-048 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77148\_1 77148 15:15 normal 2 R node-037  77148\_2 77148 15:15 normal 2 R node-037  77148\_3 77148 15:15 normal 2 R node-037  77148\_4 77148 15:22 normal 2 R node-038 | | |  |
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|  | Job Array (Throughput) | | |  |  | Job Array (Throughput) | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77823\_1 77823 09:25 normal 2 R node-047  77823\_2 77823 09:25 normal 2 R node-047  77823\_3 77823 09:25 normal 2 R node-047  77823\_4 77823 09:25 normal 2 R node-048 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  77765\_1 77765 15:15 normal 2 R node-037  77765\_2 77765 15:15 normal 2 R node-037  77765\_3 77765 15:15 normal 2 R node-037  77765\_4 77765 15:22 normal 2 R node-038 | | |  |
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|  | GPU Job | | |  |  | GPU Job | | |  |
|  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  75334 75334 09:14 gpu 1 R gpu-02 | | |  |  | JOBID ARRAY\_J START PARTITION CPUS ST NODELIST(REASON)  75625 75625 13:48 gpu 1 R gpu-01 | | |  |