

Prediction of the Jobs Execution on the Community Grid

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Grid model

- Extremely simplified Grid model
- With three super classes for all objects:
 - Resources
 - Events
 - Computations



Resources

- Resources – what differs our model from other simulators
 - Computing units
 - Hubs (computation supervisors)
- In our simulation computing are unreliable. For simplicity we assume that after failure they are up after very short random time.



Computations

- Simple model
 1. Divide job into task
 2. Execute tasks on computing nodes
 3. Merge results from computing nodes



Schedulers

- Random scheduler
- Perfect schedulers – impossible to create. Demands knowledge of computer's left uptime.
- Backup schedulers – run task up to defined number of copies.



Computing units failures

- Computer uptime is draw from exponential distribution
- We have simulated 2 situations:
 - All computers has same MTBF
 - Computer MTBFs are draw from normal distribution



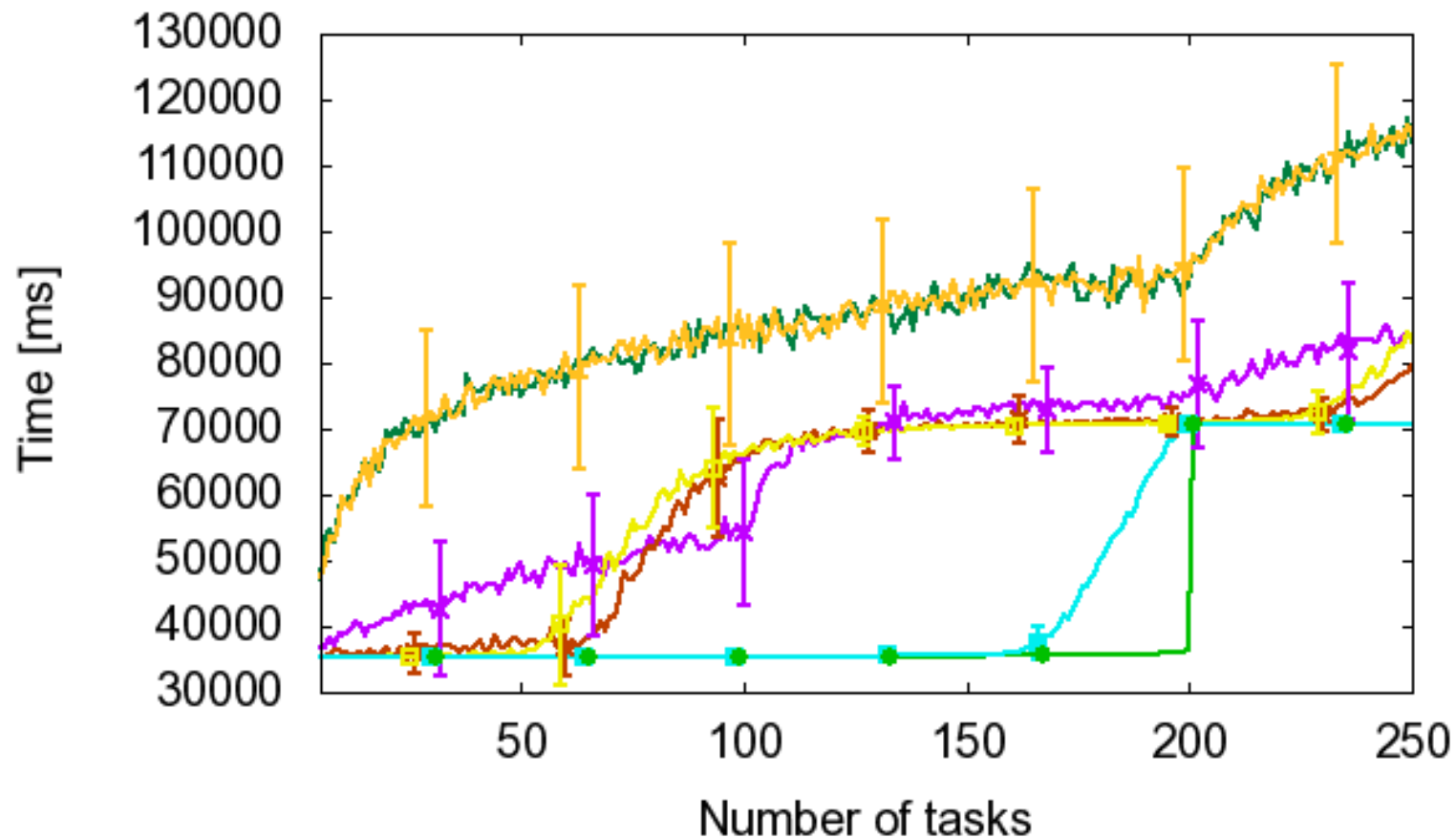
Results:

- We tested different schedulers.
- We tested only one job simulations.
- Every simulation was run 300 times
- Best results were achieved with one of backup schedulers.
- All other schedulers works as bad as random one.



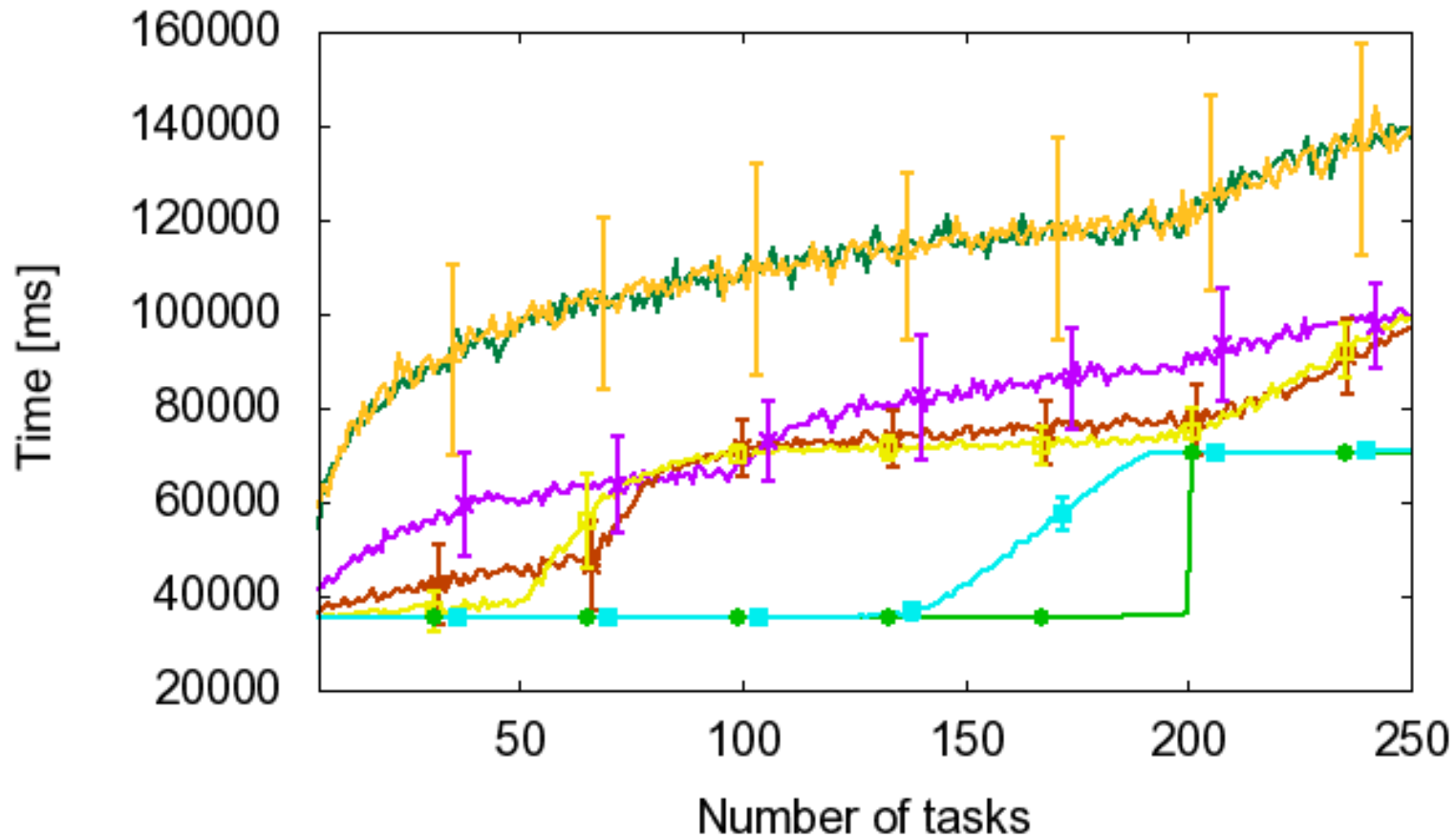
MTBF = 199000

- backup - 2 copies (purple line)
- backup - 3 copies (brown line)
- backup - 4 copies (yellow line)
- high mtbf first (green line)
- infinite MTBF (green line)
- perfect (cyan line)
- random (orange line)



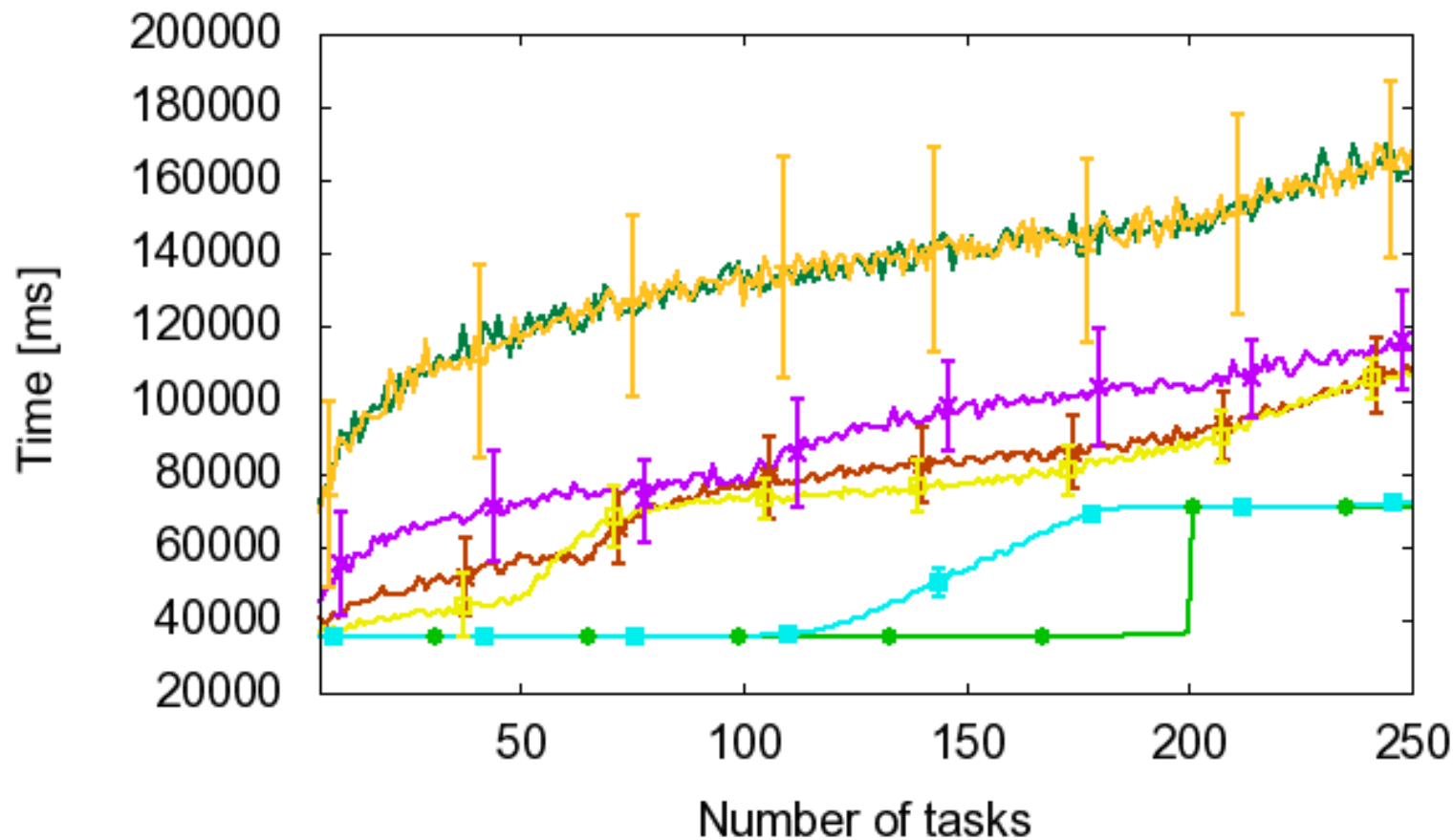
MTBF = 99500

- backup - 2 copies (purple line)
- backup - 3 copies (orange line)
- backup - 4 copies (yellow line)
- high mtbf first (green line)
- infinite MTBF (green line with square markers)
- perfect (cyan line with square markers)
- random (orange line with square markers)



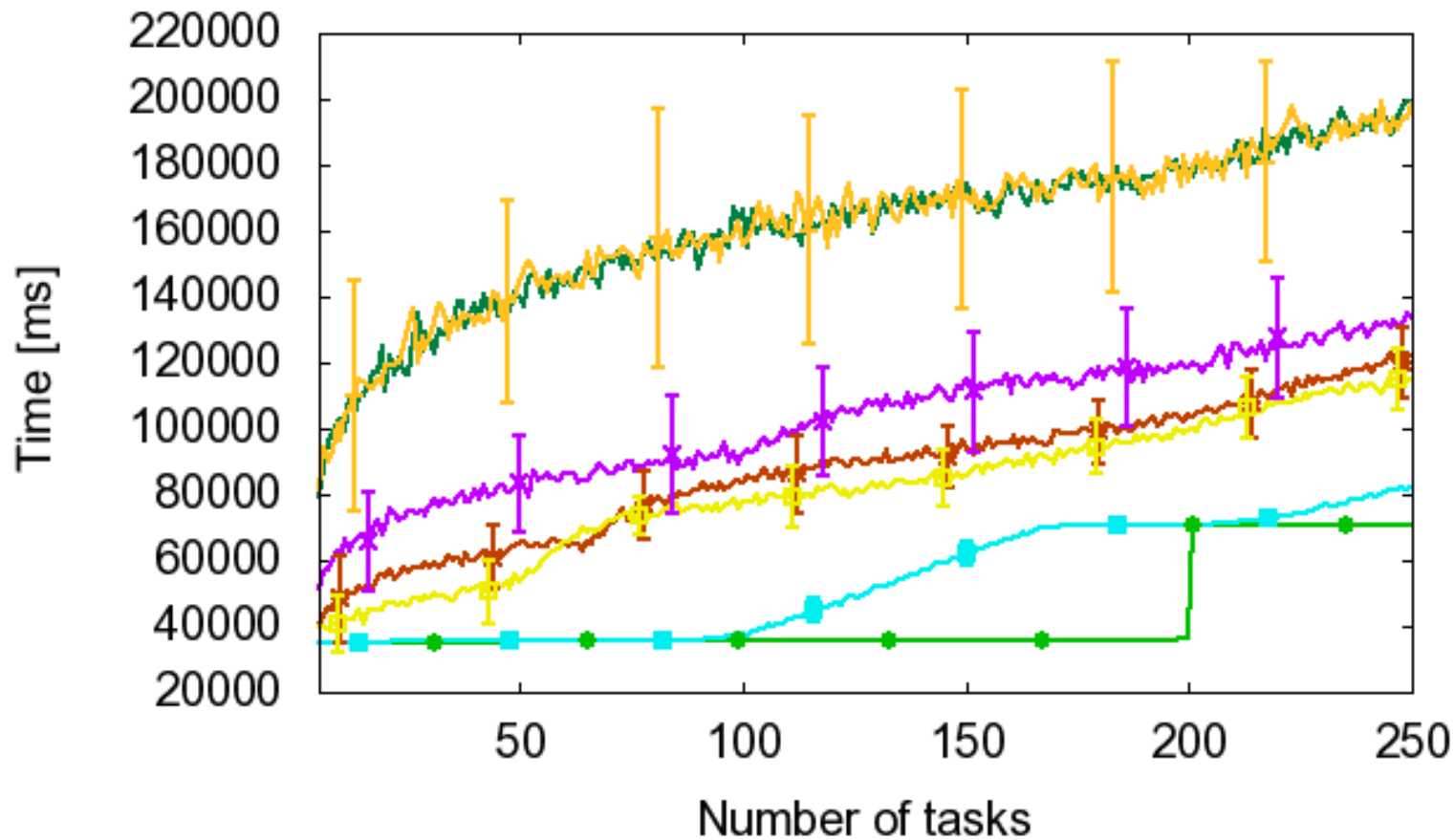
MTBF = 66075

- backup - 2 copies (purple line)
- backup - 3 copies (orange line)
- backup - 4 copies (yellow line)
- high mtbf first (green line)
- infinite MTBF (green line with dots)
- perfect (cyan line with squares)
- random (orange line with error bars)



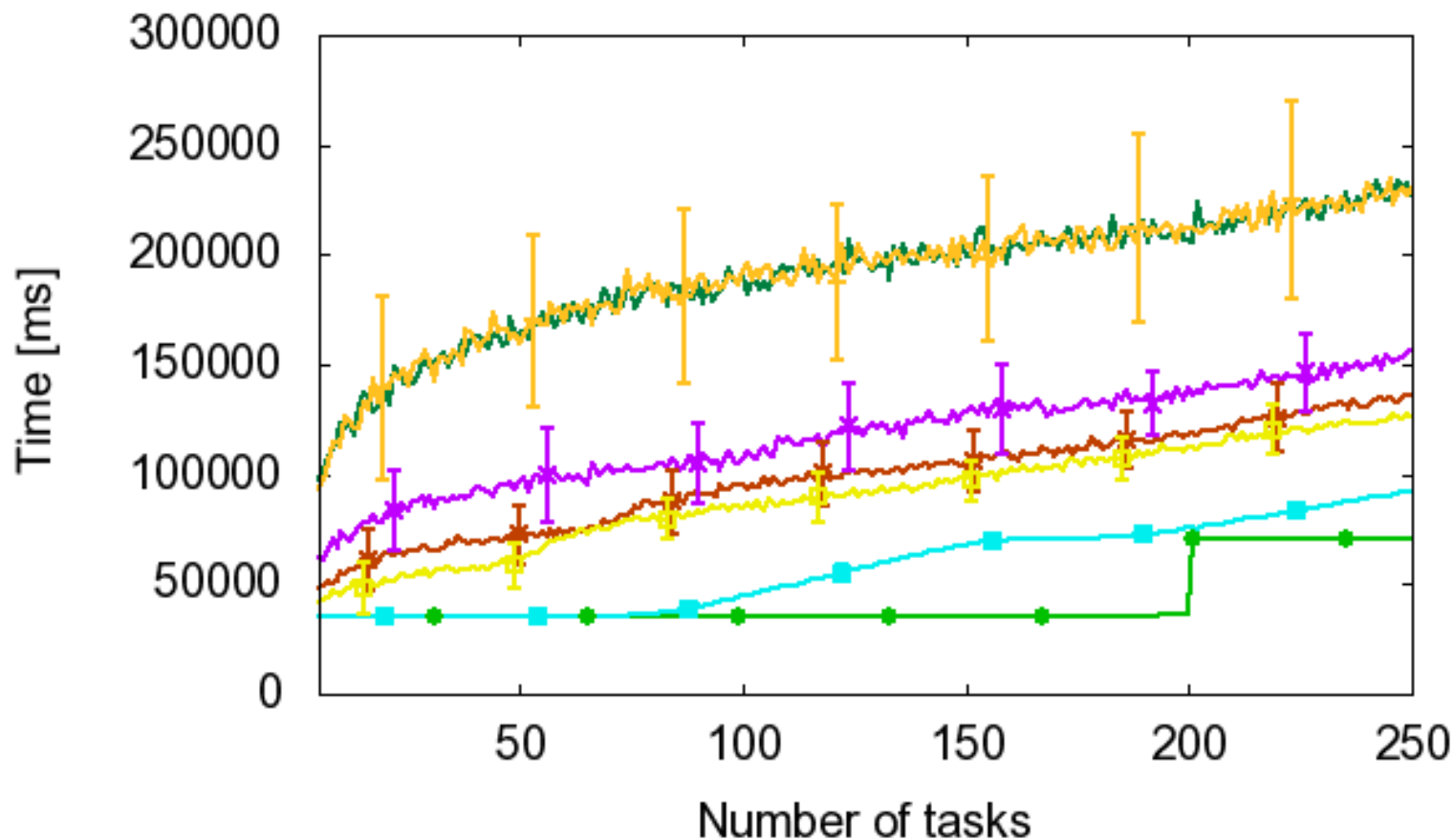
MTBF = 49500

- backup - 2 copies (purple line)
- backup - 3 copies (brown line)
- backup - 4 copies (yellow line)
- high mtbf first (green line)
- infinite MTBF (green line with square markers)
- perfect (cyan line)
- random (orange line)



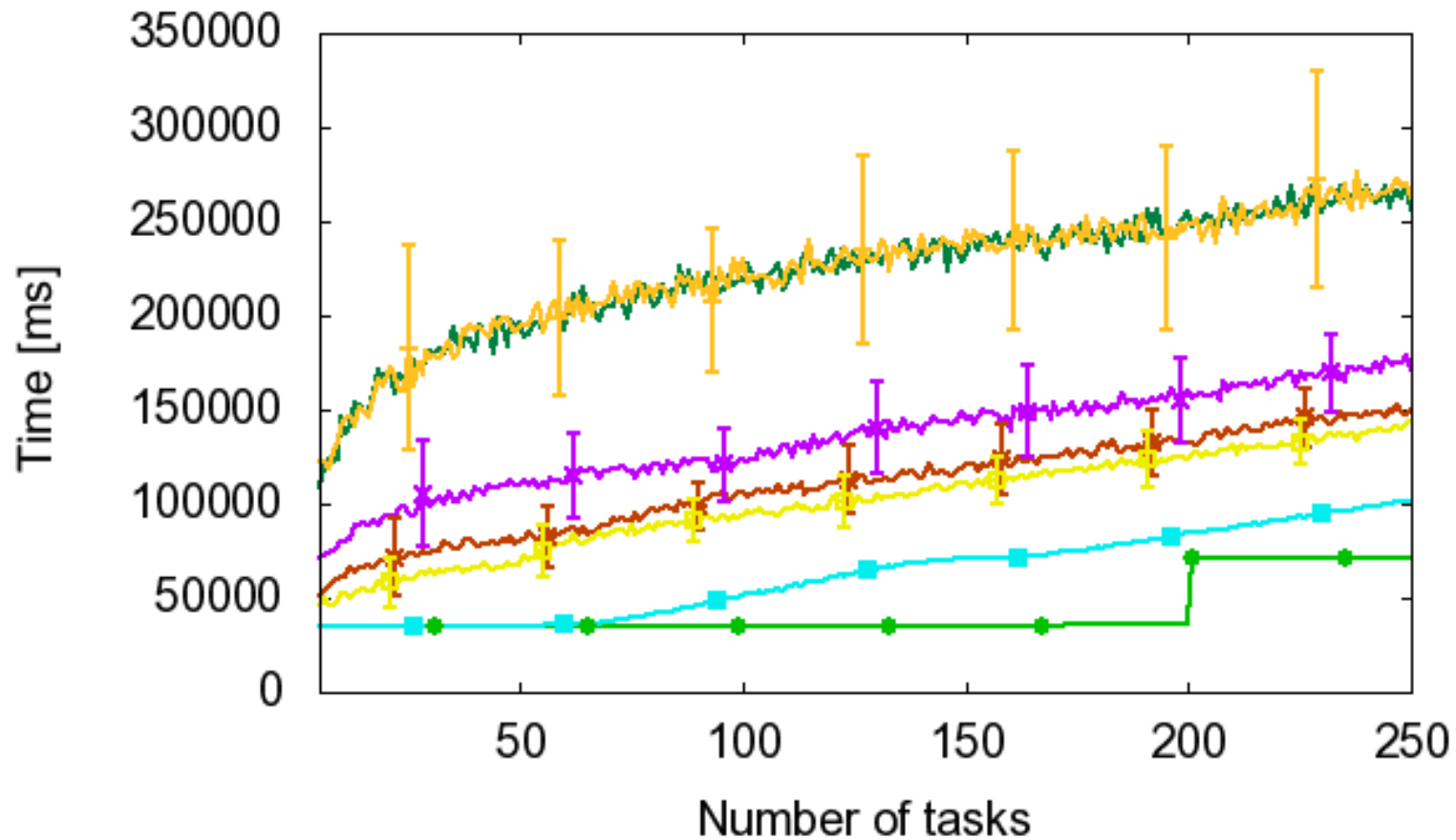
MTBF = 39400

- backup - 2 copies (purple line)
- backup - 3 copies (brown line)
- backup - 4 copies (yellow line)
- high mtbf first (dark green line)
- infinite MTBF (light green line)
- perfect (cyan line)
- random (orange line)



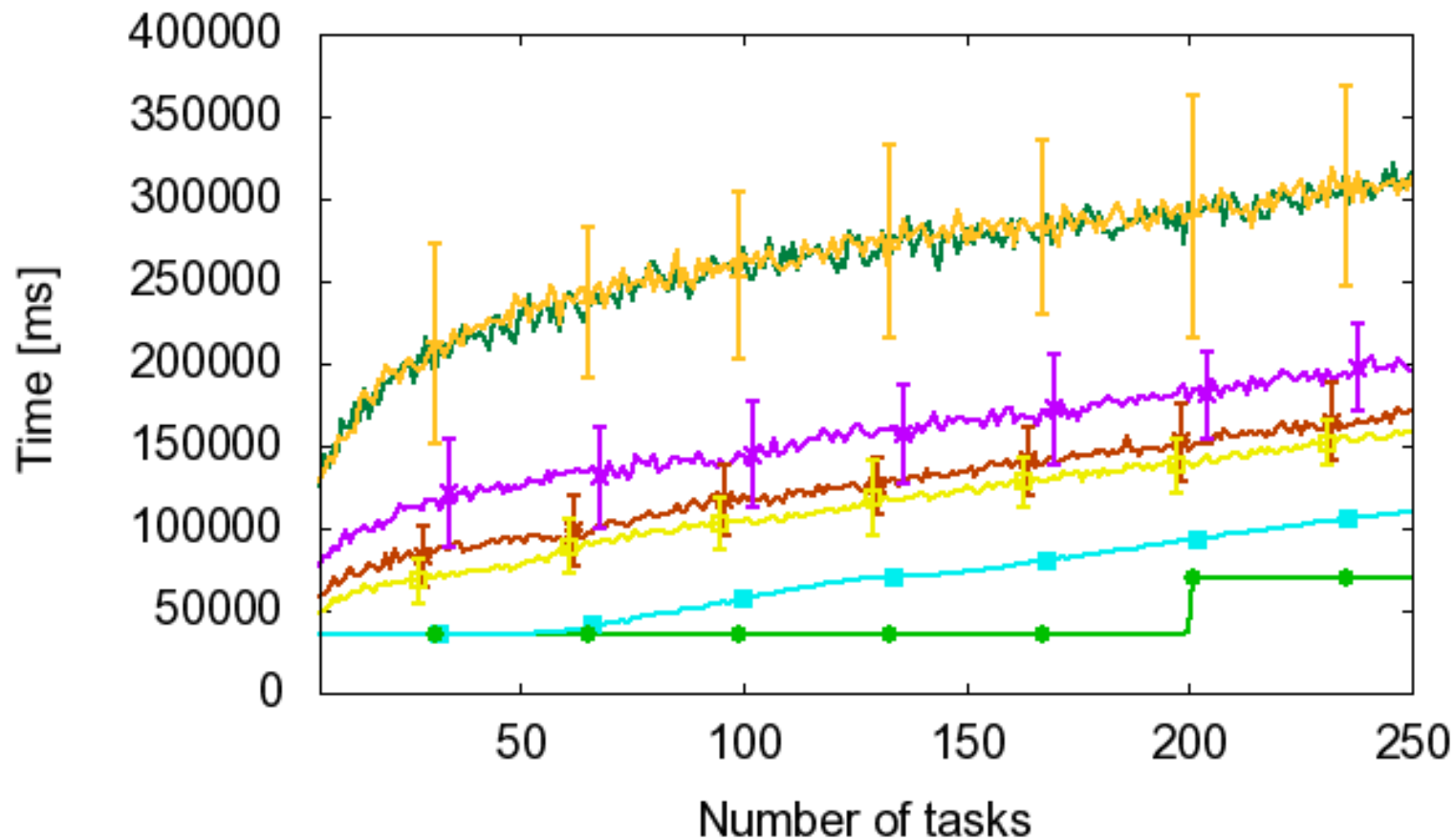
MTBF = 32800

backup - 2 copies  infinite MTBF 
backup - 3 copies  perfect 
backup - 4 copies  random 
high mtbf first 



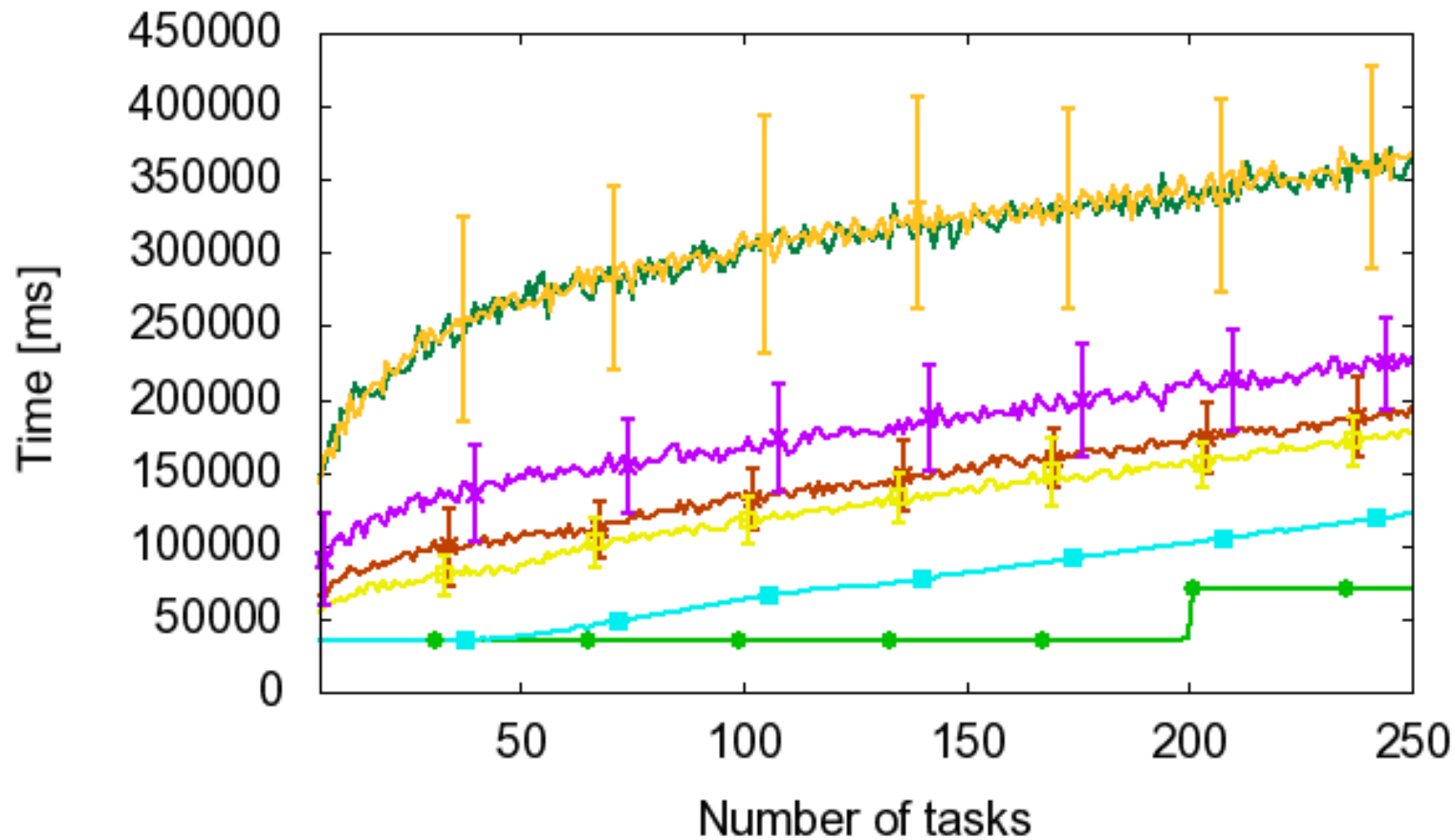
MTBF = 28000

backup - 2 copies — purple
backup - 3 copies — brown
backup - 4 copies — yellow
high mtbf first — green
infinite MTBF — green
perfect — cyan
random — orange



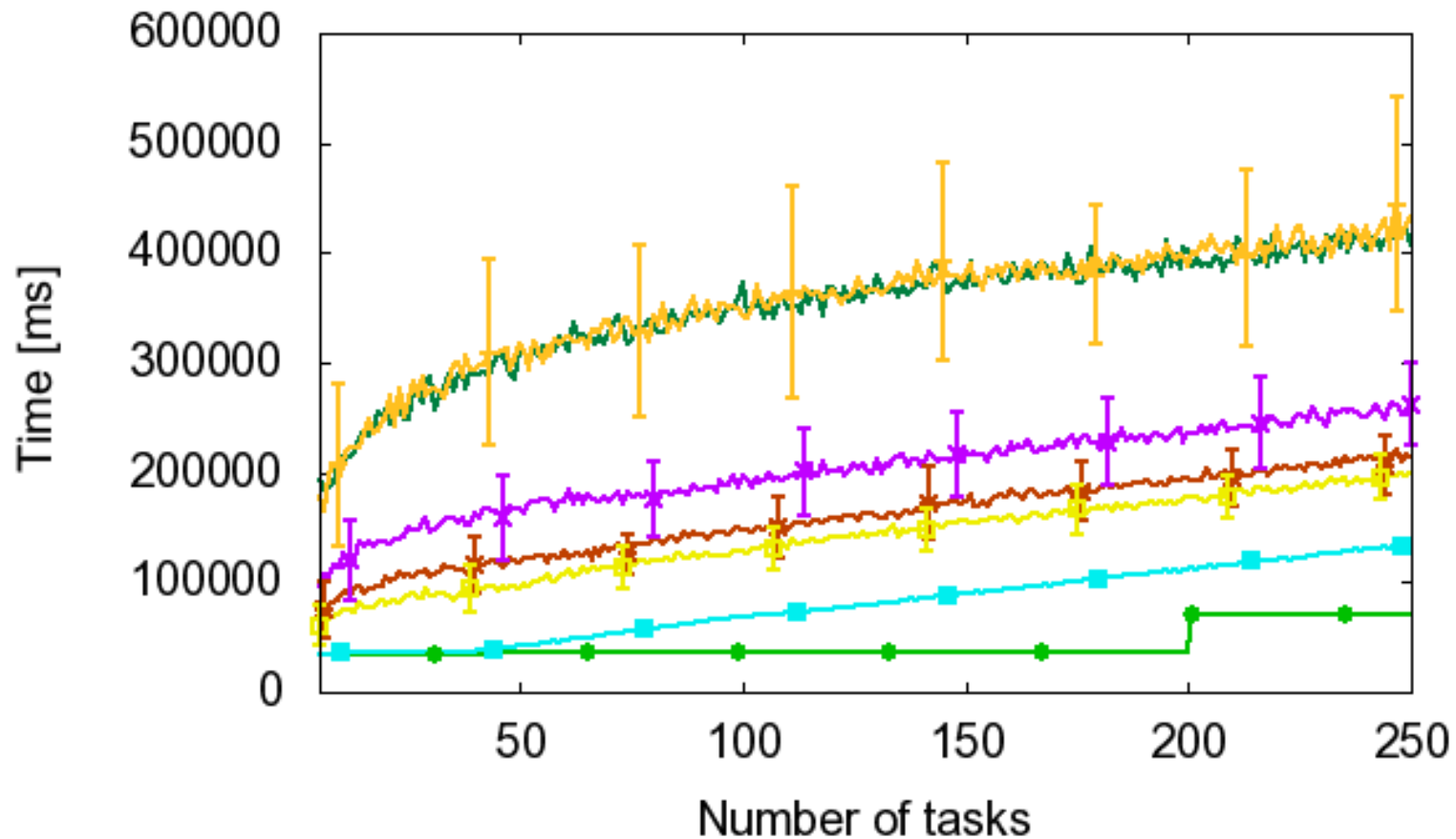
MTBF=24480

- backup - 2 copies (purple line)
- backup - 3 copies (brown line)
- backup - 4 copies (yellow line)
- high mtbf first (green line)
- infinite MTBF (green line with circles)
- perfect (cyan line with squares)
- random (orange line)



MTBF=21700

backup - 2 copies — purple line
backup - 3 copies — brown line
backup - 4 copies — yellow line
high mtbf first — dark green line
infinite MTBF — light green line
perfect — cyan line
random — orange line



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