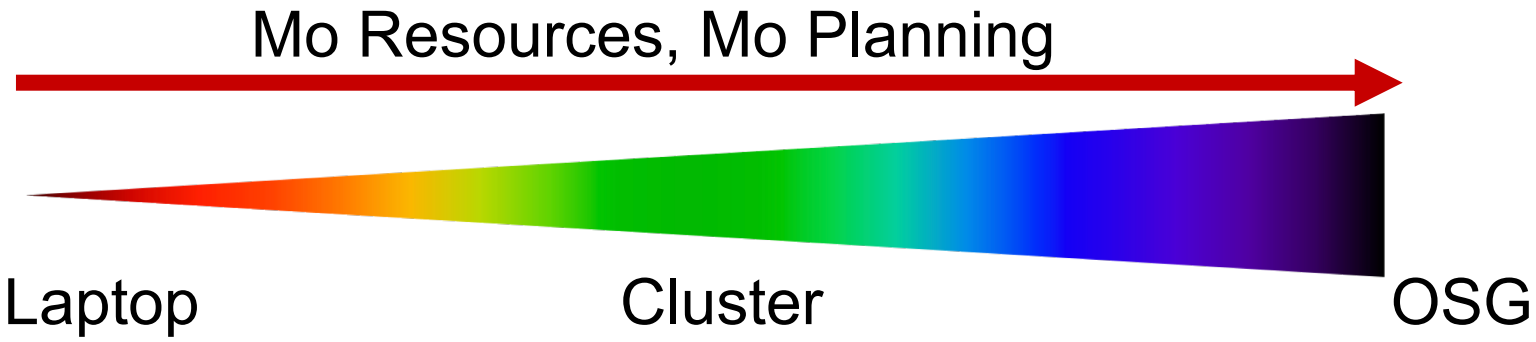
Data Considerations

Thursday AM, Lecture 1

Lauren Michael

Like all things

- I always think of HTC/OSG usage as a spectrum:



Planning?

- Can’t control a cluster like your laptop, where you can install any software and place files (until they flat-out don’t fit)

- OSG: heterogeneity, borrowed resources (including network and disk), lack of on-the-fly troubleshooting

Benefits!

- On a cluster & OSG you can access 1000+ cores!
- Automate job tasks (with HTCondor)!
- Doesn't burn up your laptop!

Overview – Data Handling

- Review of HTCondor Data Handling
- Data Management Tips
- What is ‘Large’ Data?
- Dealing with Large Data
  - Next talks: OSG-wide methods for large-data handling, and when to stay ‘local’

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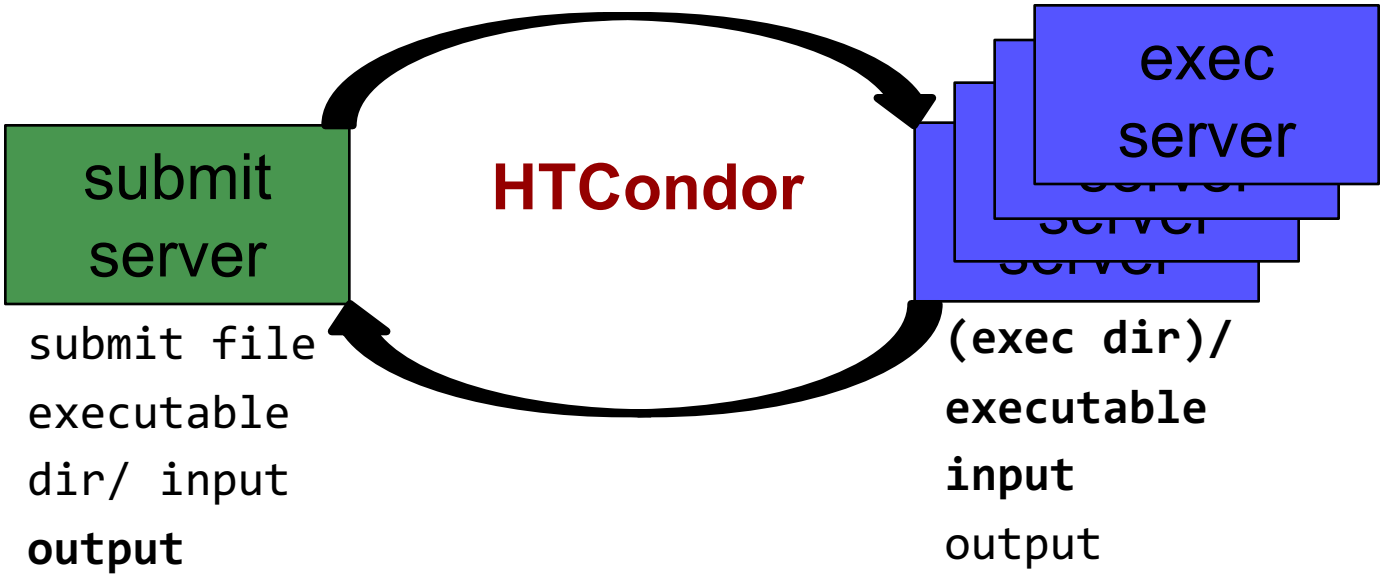
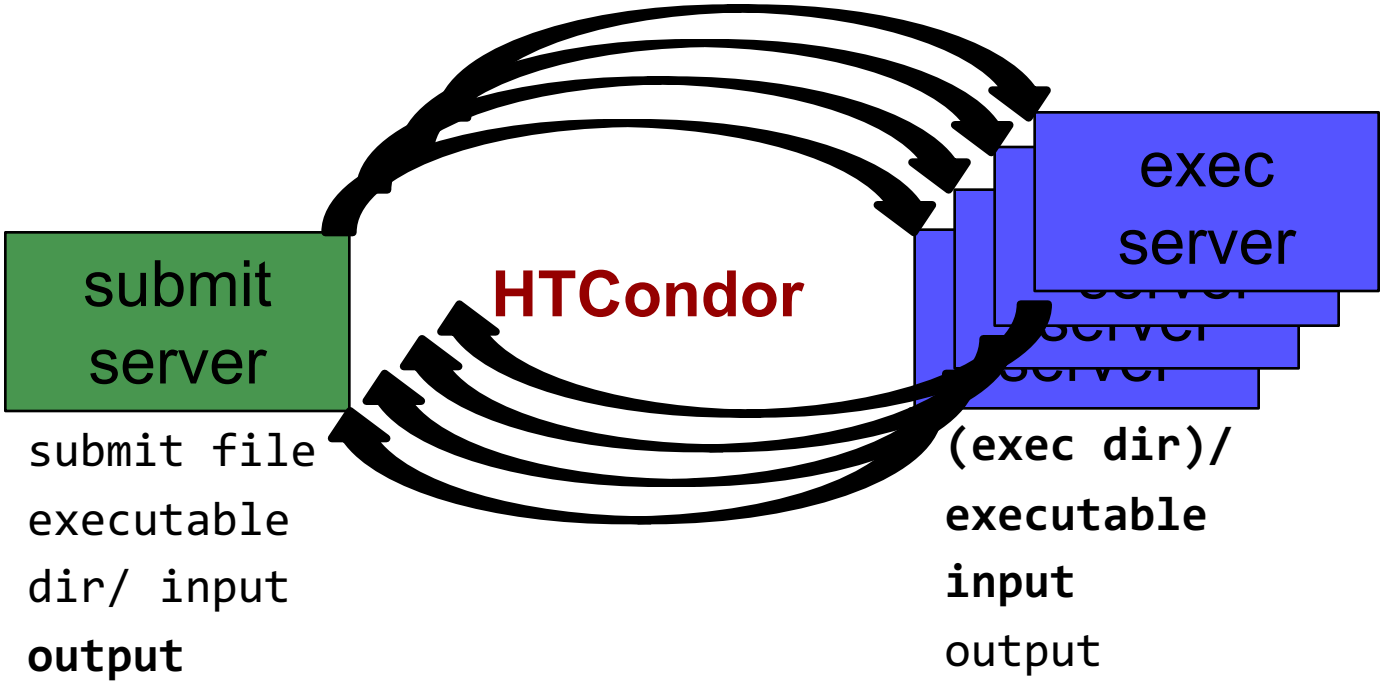
Review: HTCondor Data Handling



Network bottleneck: the submit server



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Data Management Tips

- **Determine your per-job needs**
  - minimize per-job data needs
- Determine your *batch* needs
- Leverage HTCondor and OSG data handling features!

Determining In-Job Needs

- "Input" includes *any* files transferred by HTCondor
  - `executable`
  - `transfer_input_files`
  - data *and* software
- "Output" includes any files copied back by HTCondor
  - `output, error`

First! Try to minimize your data

- split large input for better throughput
- eliminate unnecessary data
- file compression and consolidation
  - job input: prior to job submission
  - job output: prior to end of job
  - moving data between your laptop and the submit server

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What is ~~big~~ large data?

- In reality, “big data” is relative
  - What is ‘big’ for *you*? Why?

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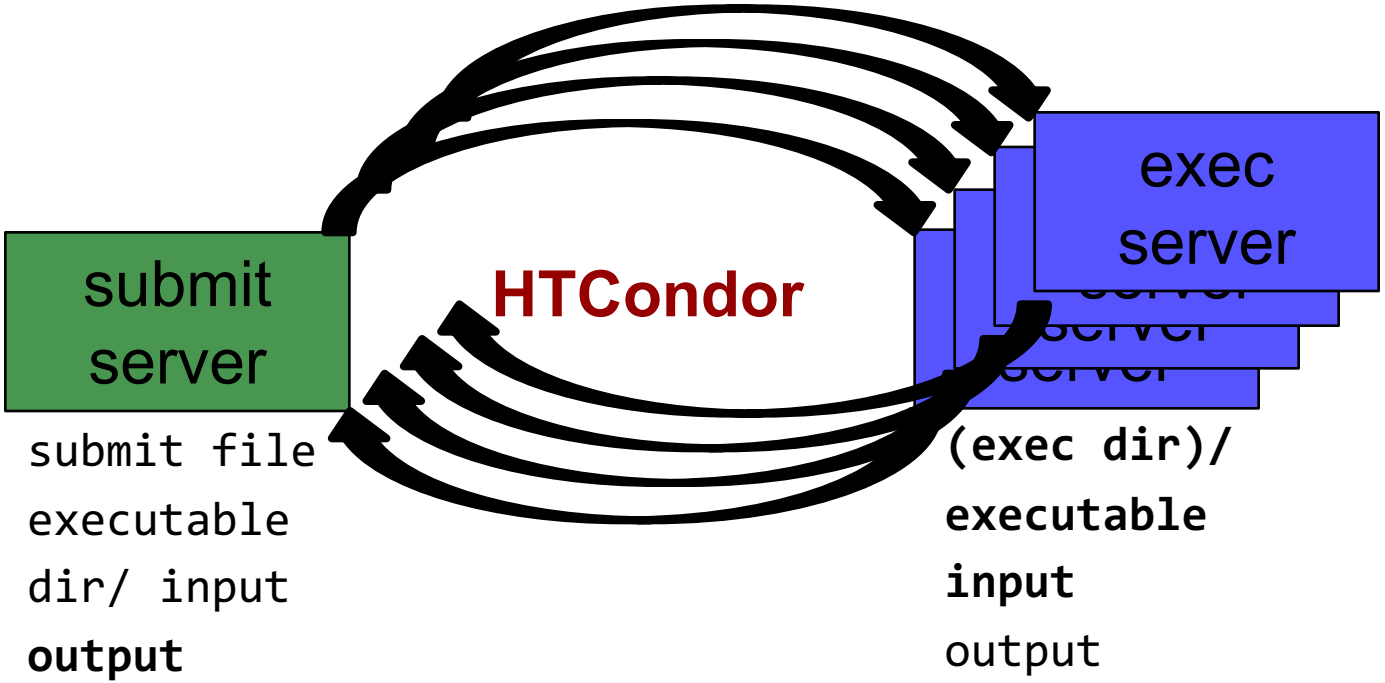
What is ~~big~~ large data?

- In reality, “big data” is relative
  - What is ‘big’ for *you*? Why?
- Volume, velocity, variety!
  - think: a million 1-KB files, versus one 1-TB file

Network bottleneck: the submit server

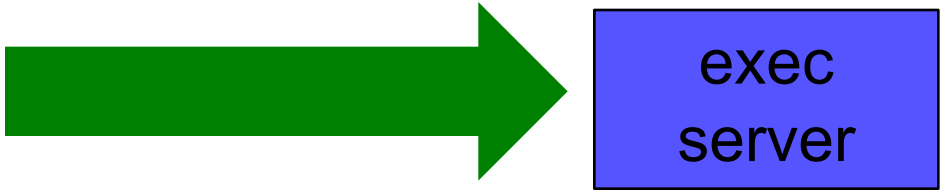


‘Large’ input data: The collaborator analogy

- What method would you use to send data to a collaborator?

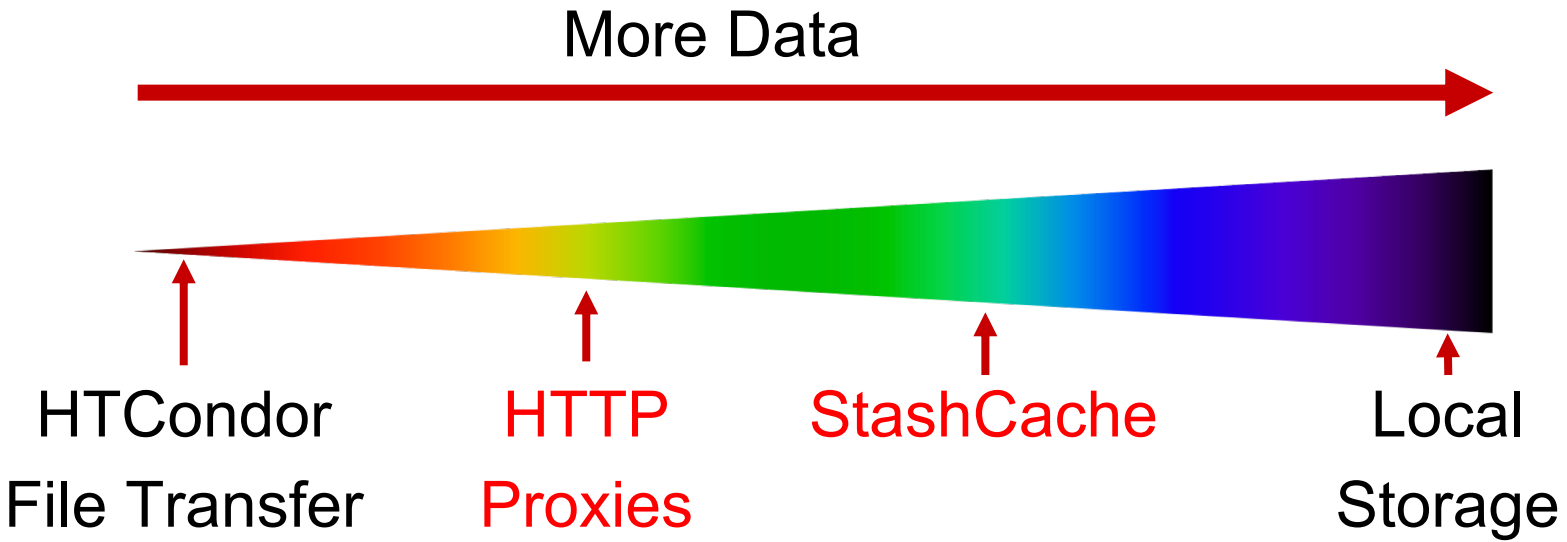
amount	method of delivery
words	email body
tiny – 100MB	email attachment (managed transfer)
100MB – GBs	download from Google Drive, Drop/Box, other web-accessible repository
TBs	ship an external drive (local copy needed)

Large *input* in HTC and OSG

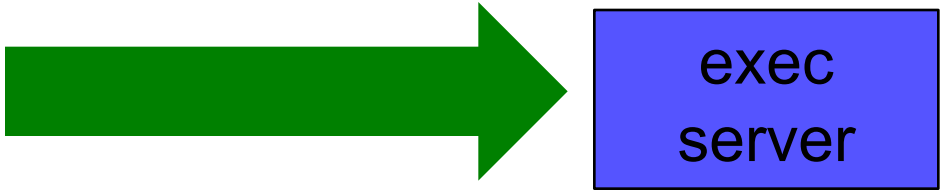


amount	method of delivery
words	within executable or arguments?
tiny – 100MB per file	HTCondor file transfer (up to 1GB total)
100MB – 1GB, shared	download from web server (local caching)
1GB - 20GB, unique or shared	StashCache (regional replication)
20 GB - TBs	shared file system (local copy, local execute servers)

Transfers


More Data
HTCondor
File Transfer
HTTP
Proxies
StashCache
Local
Storage

Large *input* in HTC and OSG



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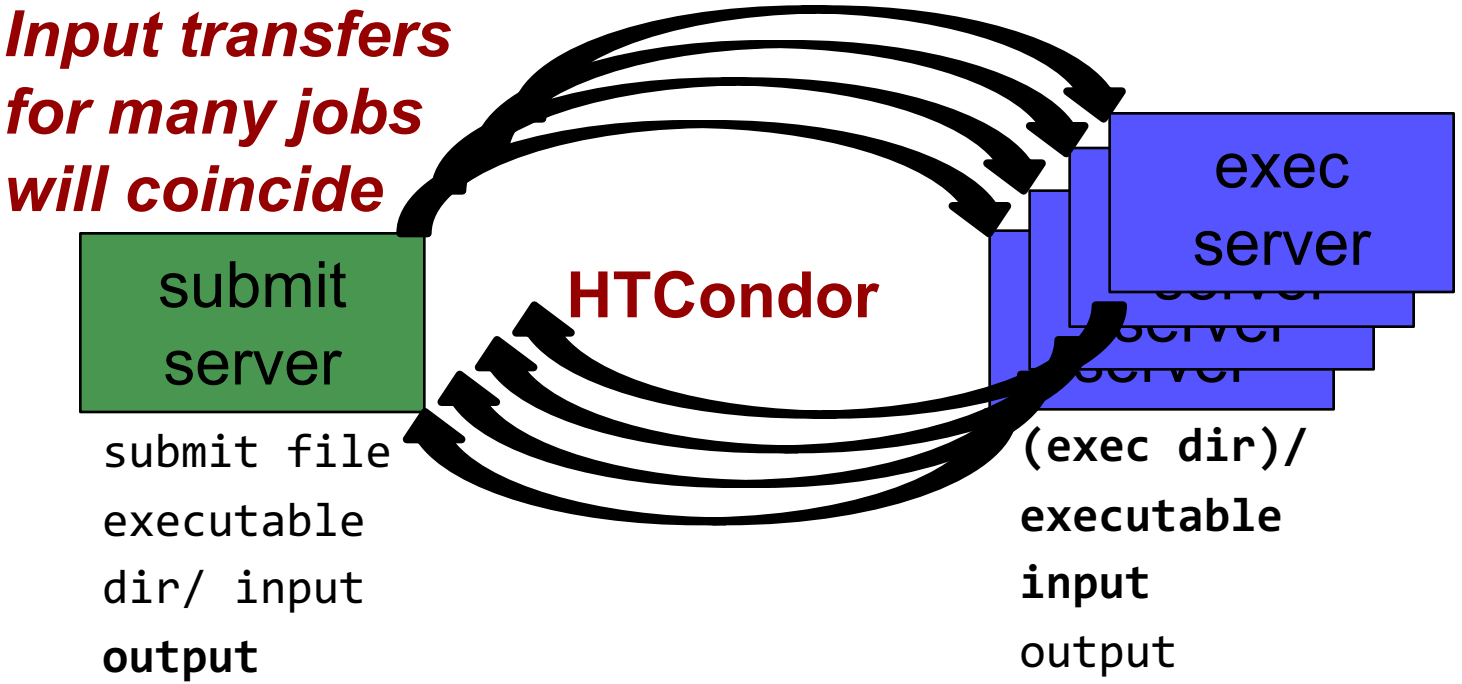

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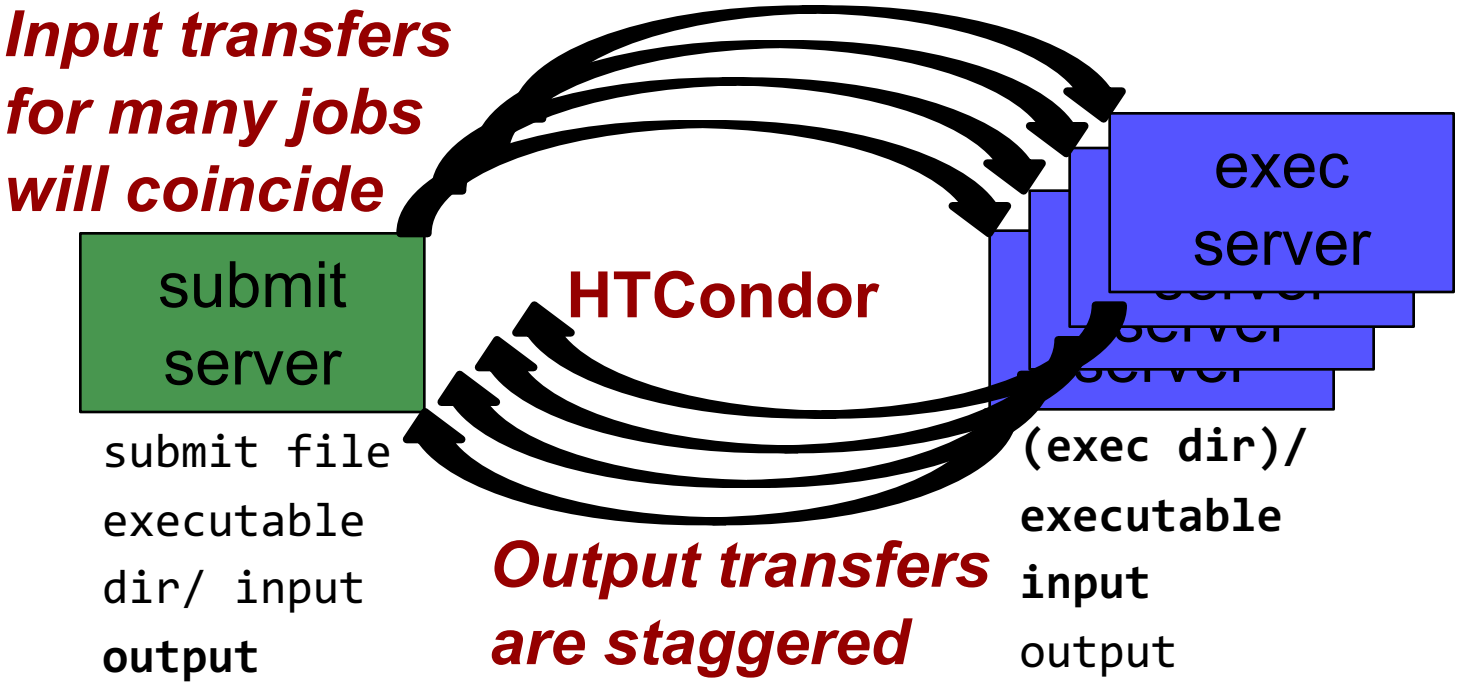

Output for HTC and OSG

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1GB+, total	shared file system (local copy, local execute servers)

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- Why are there fewer options than for input?

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Exercises

- 1.1 Understanding a job's data needs
- 1.2 Using data compression with HTCondor file transfer
- 1.3 Splitting input (prep for large run in 2.1)

Questions?

- Next: Exercises 1.1-1.3
- Later: Handling *large* input data

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