Data Considerations

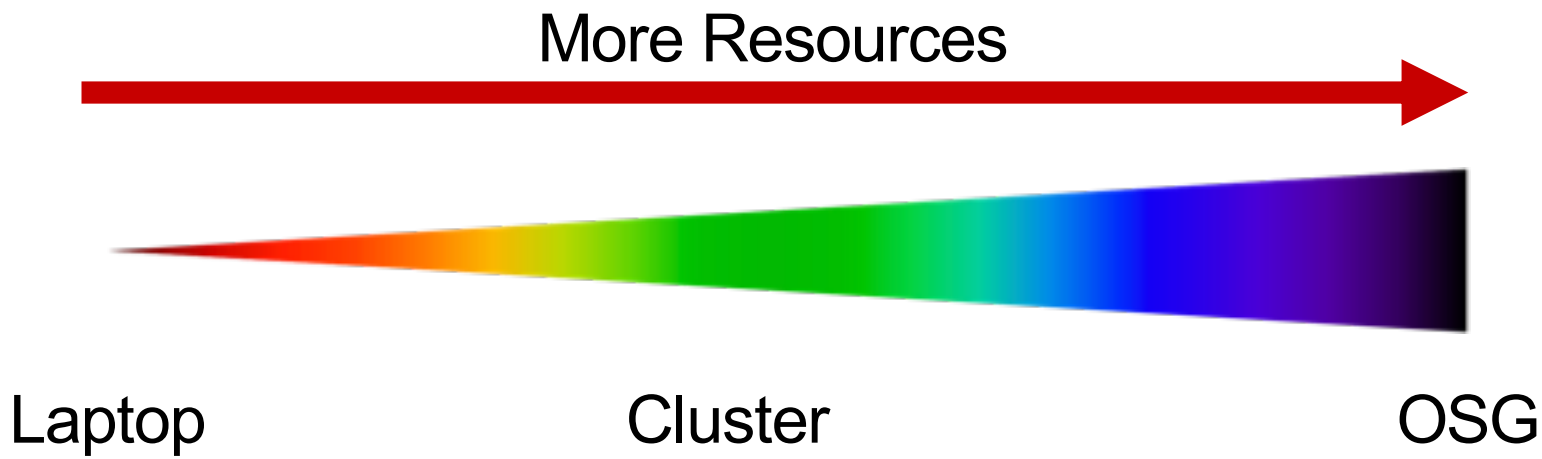
Thursday AM, Lecture 2

Derek Weitzel
OSG

Like all things

- I always think of Grid usage as a spectrum
- As you get access to more resources, it gets more difficult

Like all things



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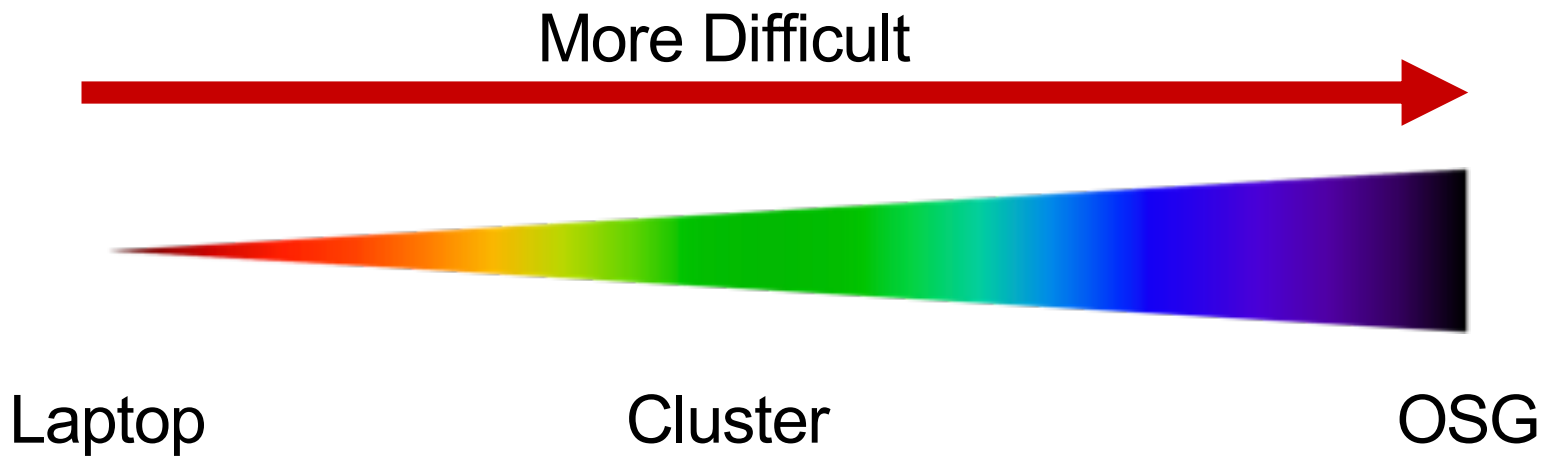


Open Science Grid

Difficult?

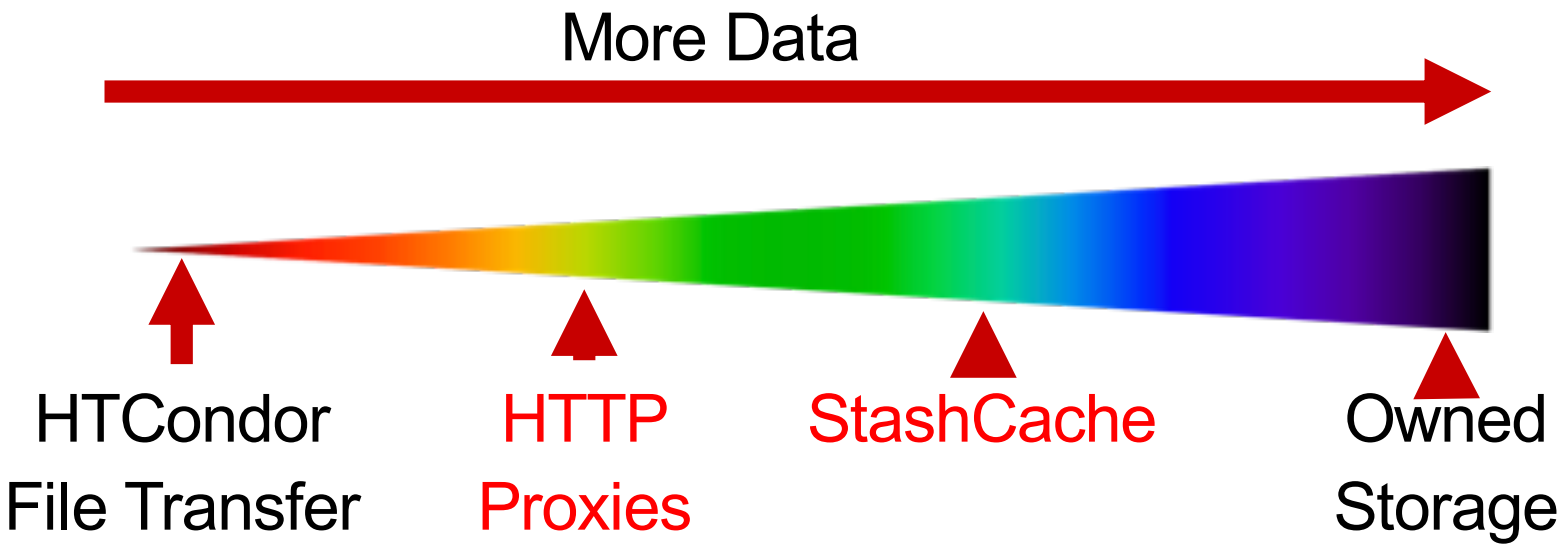
- Can’t control a cluster like your laptop, install anything
- Worry about different sites
- Can’t have interactive jobs in the OSG

Benefits!

- On a cluster & OSG you can access 1000+ cores!

- More Memory!
- Doesn’t heat up your laptop!

Transfers


More Data
HTCondor
File Transfer
HTTP
Proxies
StashCache
Owned
Storage

Overview – Data Handling

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

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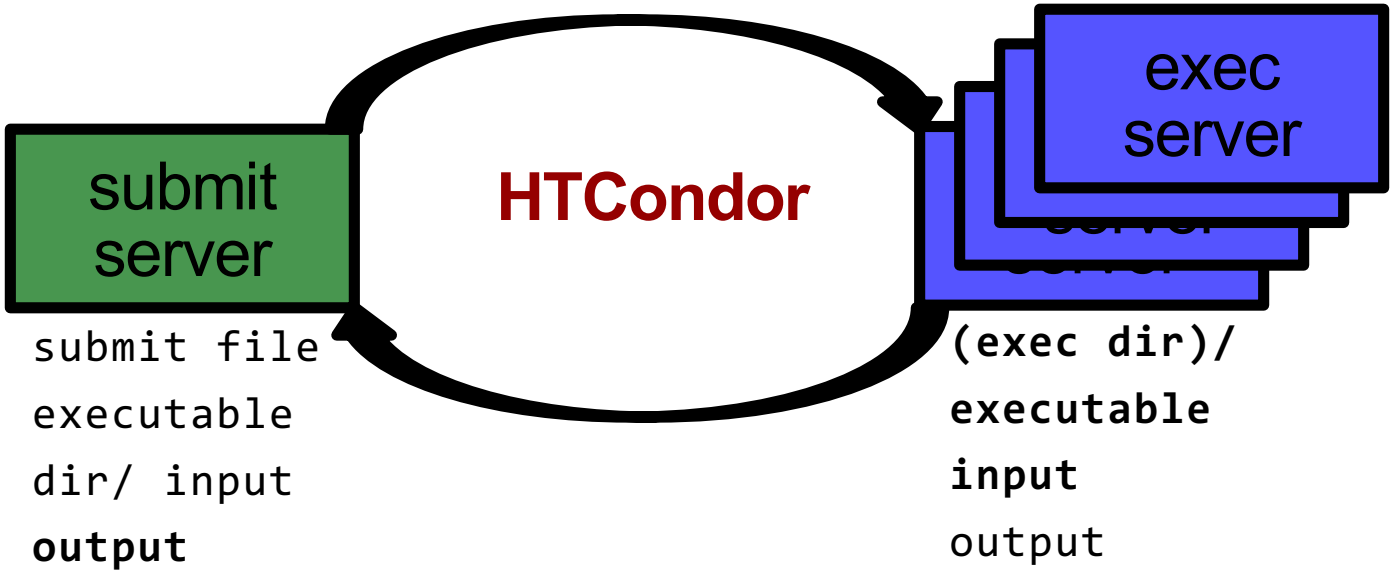
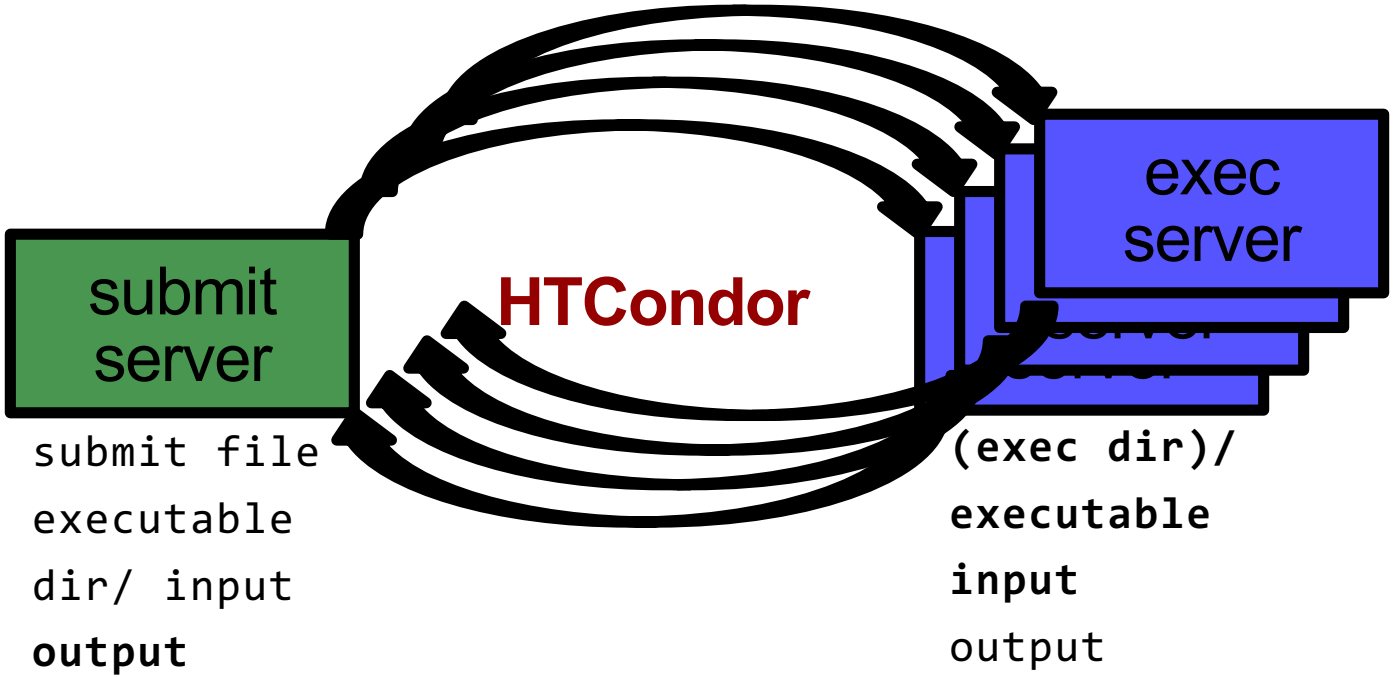
Review: HTCondor Data Handling



Network bottleneck: the submit server



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Data Management Tips

- **Determine your job needs**
- Determine your *batch* needs
- Leverage HTCondor data handling features!
- Reduce per-job data needs

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`

Data Management Tips

- **Determine your job needs**
- Determine your *batch* needs
- Leverage HTCondor data handling features!
- Reduce per-job data needs

First! Try to reduce 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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Open Science Grid

What is ~~big~~ large data?

- For researchers “big data” is relative
  - What is ‘big’ for you? Why?

Open Science Grid

What is ~~big~~ large data?

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

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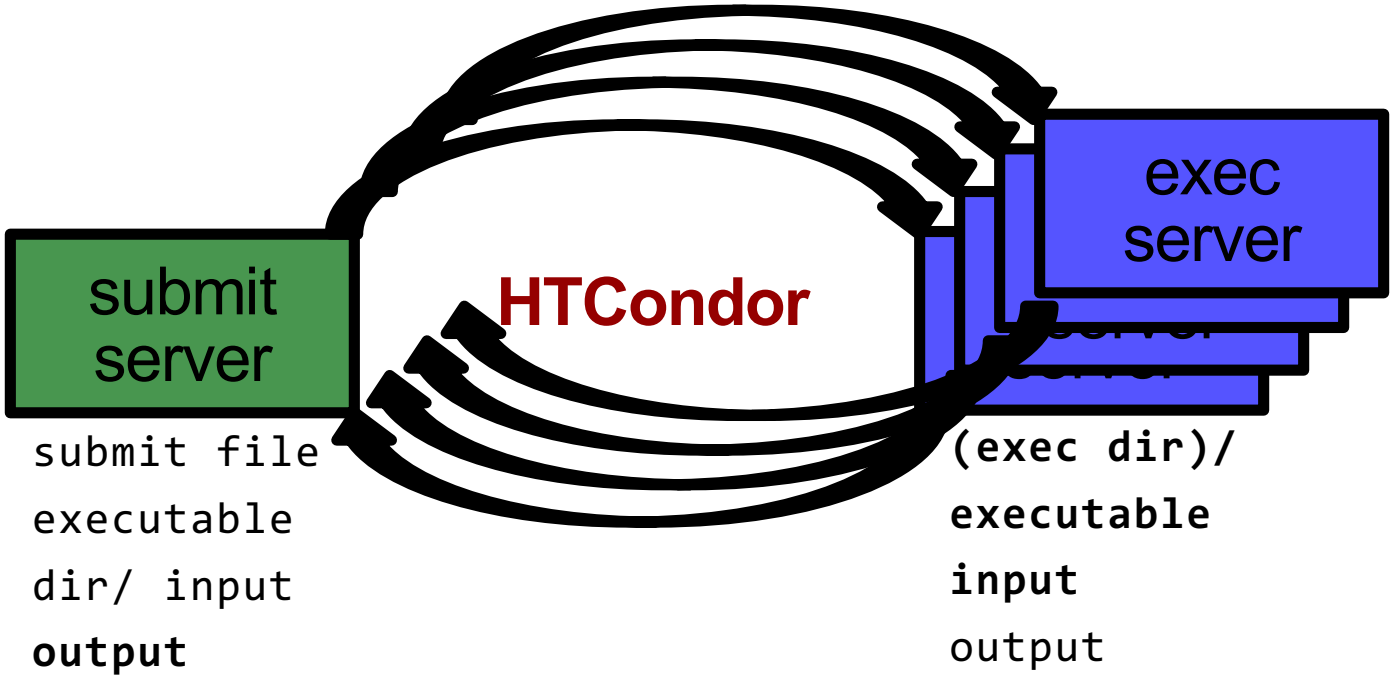

‘Large’ input data: The collaborator analogy

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

amount	method of delivery
words	email body
tiny – 10MB	email attachment (managed transfer)
10MB – GBs	download from Google Drive, Drop/Box, other web-accessible server
TBs	ship an external drive (local copy needed)

Large input in HTC and OSG

- What methods should you use for HTC and OSG?

amount	method of delivery
words	within executable or arguments?
tiny – 10MB per file	HTCondor file transfer (up to 1GB total)
10MB – 1GB, shared	download from web proxy (network-accessible server)
1GB - 20GB, unique or shared	StashCache (regional replication)
20 GB - TBs	shared file system (local copy, local execute servers)

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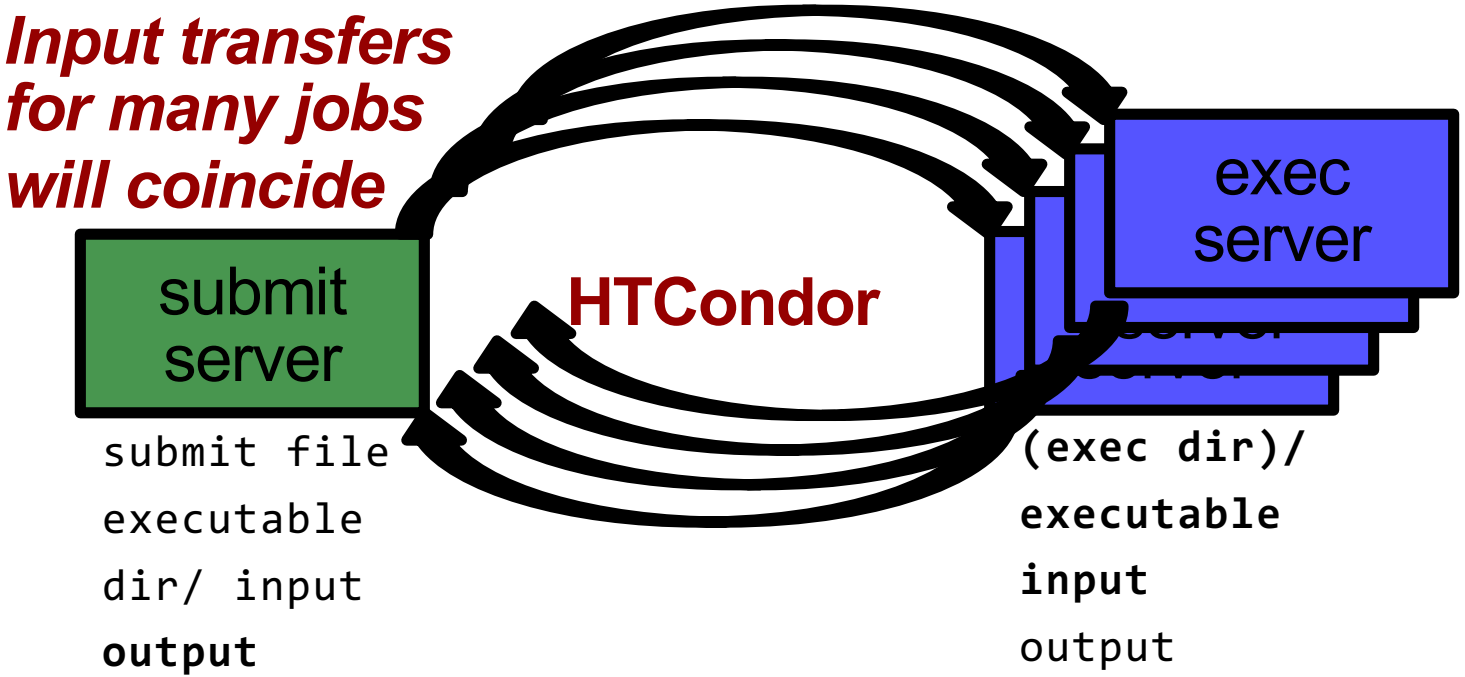

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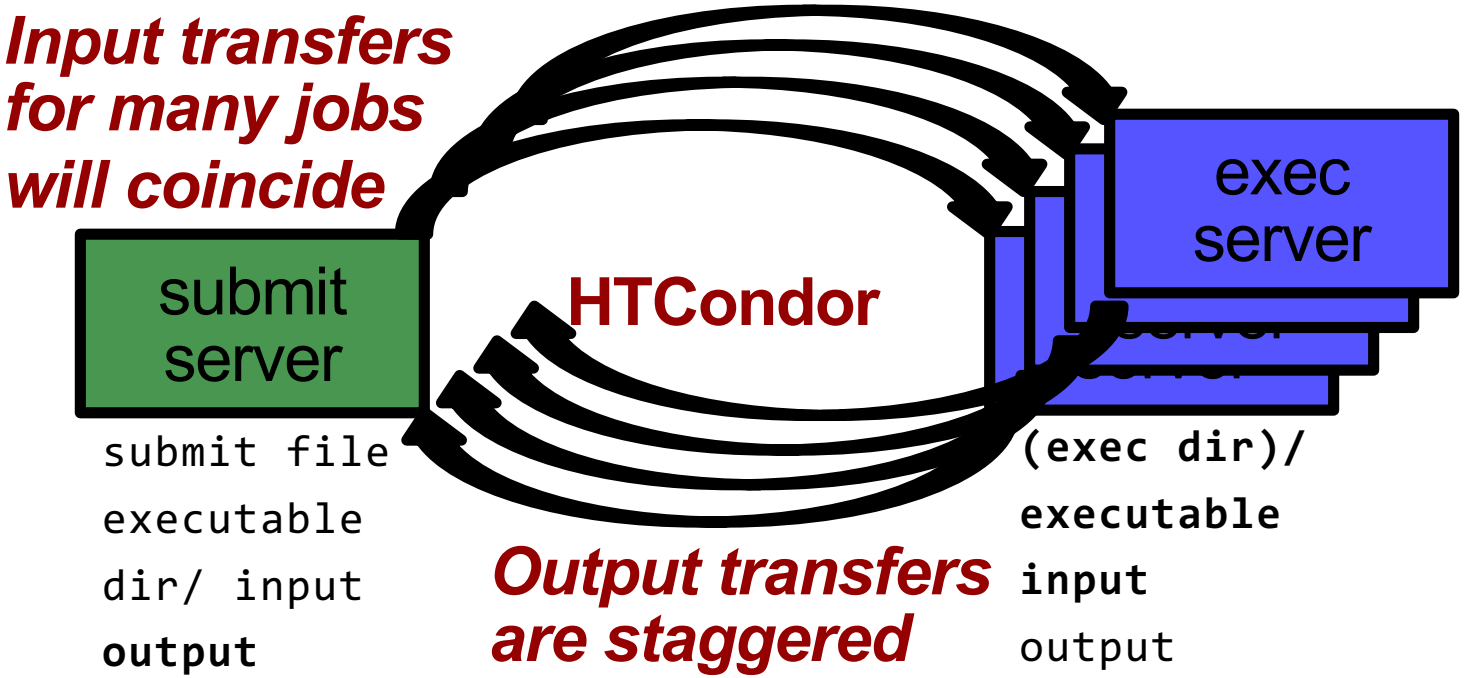

Output for HTC and OSG

amount	method of delivery
~~words~~	~~within executable or arguments?~~
tiny – **1GB, total**	HTCondor file transfer
1GB+	shared file system (local copy, local execute servers)

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tiny – **1GB**	HTCondor file transfer
1GB+	shared file system (local copy, local execute servers)

- Why are there fewer options?

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Exercises

- 2.1 Understanding a job's data needs
- 2.2 Using data compression with HTCondor file transfer
- 2.3 Splitting input (prep for large run in 3.1)

Questions?

- Feel free to contact me:
  - dweitzel@cse.unl.edu

- Next: Exercises 2.1-2.3
- Later: Handling large input data