A Personal Cloud Controller

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DATA TO INSIGHT CENTER
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Problems

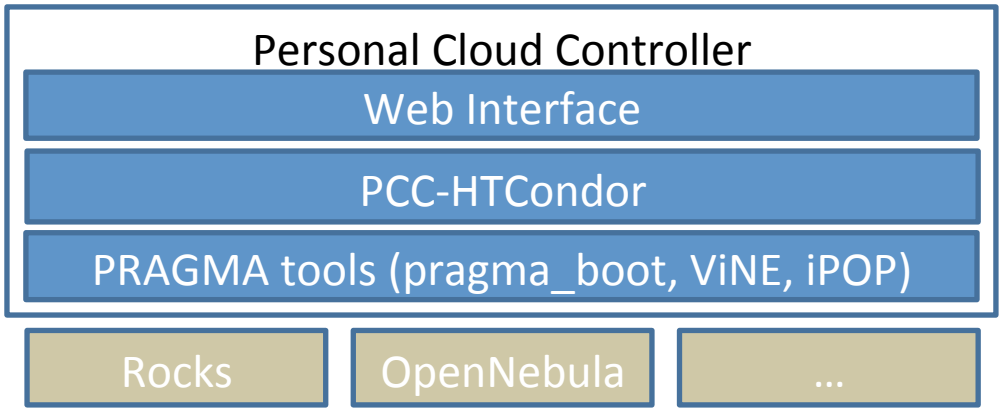
- To fully leverage existing resources for their applications, users often need to manually configure available resources to a custom configuration, a time consuming task.
- Labs may have a suite of applications with different requirements and runtime profiles (e.g., compute intensive, data intensive, data sensitive) necessitating different scheduling approaches.
- Collaborative e-Science projects typically require data processing to be performed on distributed data sets. Some data are so sensitive that they cannot be processed out of certain administrative boundaries.
- Checkpointing is a direction to achieve fault tolerance. But in some cases, checkpointing is expensive as it consumes large amount of time and resources.

Solution Space

- User Controllability
- Resource Allocation
- Sensitive Data Processing
- Fault Tolerance for Long-Run Applications

Personal Cloud Controller
(Solution to user controllability)

- Personal Cloud Controller (PCC) integrates and leverages PRAGMA tools to easily deploy and manage virtual clusters.
- PCC is lightweight and extends HTCondor for scheduling and fault tolerance capabilities. PCC
  - Provides flexible interface to enable a high level of user controllability,
  - Automates configuration, deployment, and fault recovery on behalf of user.



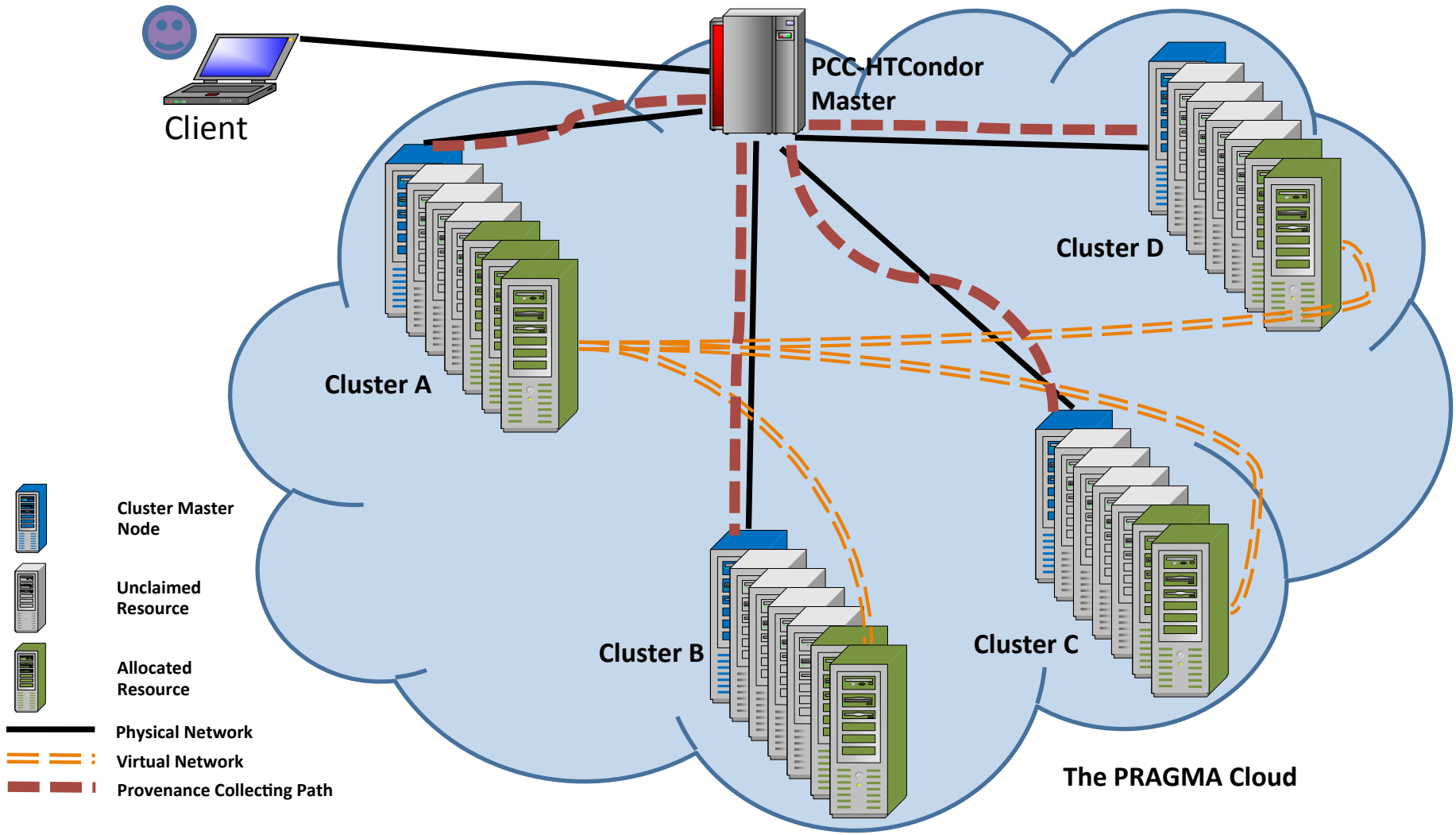
Personal Cloud Controller – *cont'd*

Fundamentals of the following…

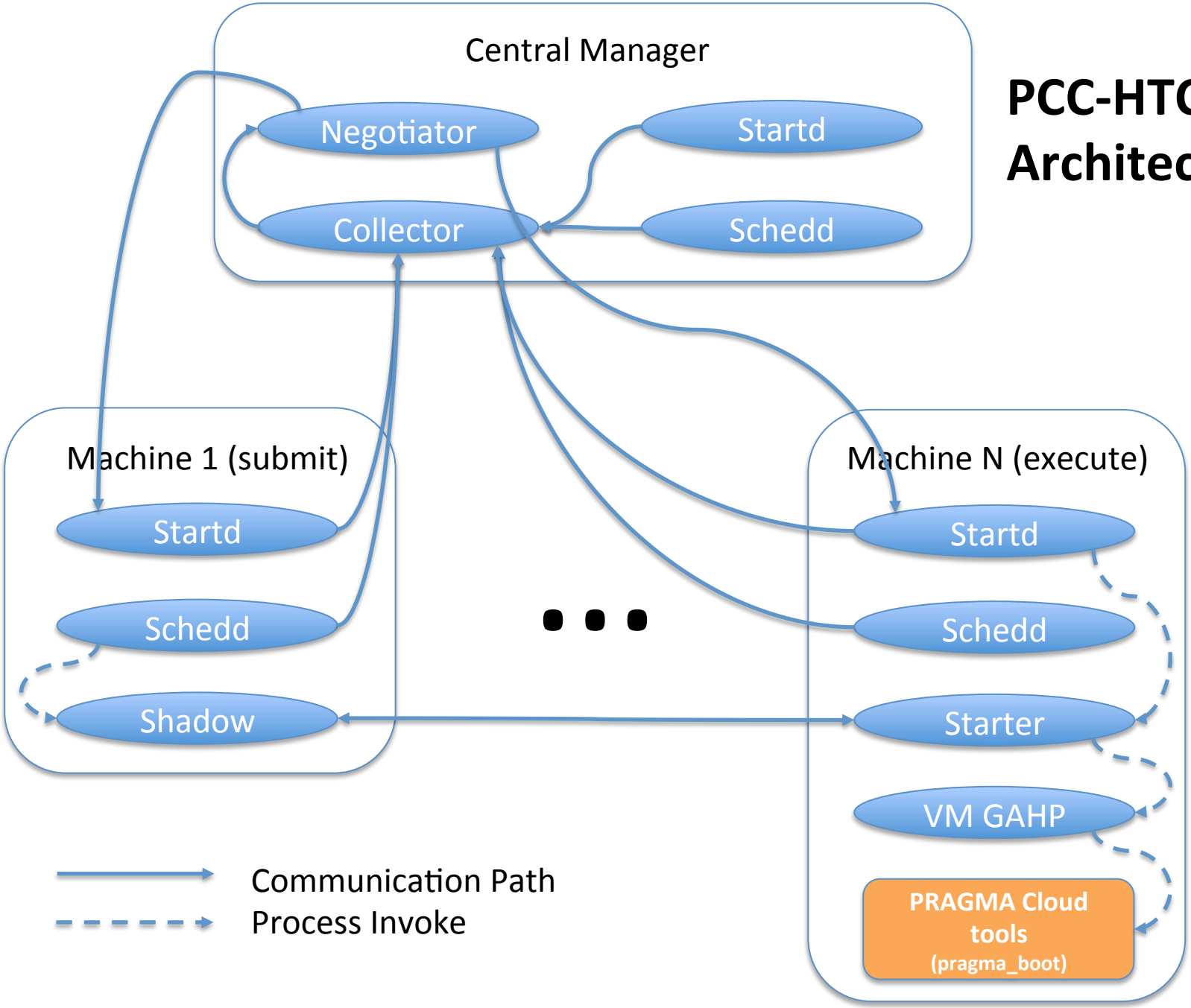
- Resource Allocation
  - Resources and applications advertising
  - Match resources and applications
- Sensitive Data Processing
  - PCC enabled PRAGMA Cloud
- Long-Run Applications Fault Tolerance
  - HTCondor's checkpointing mechanism

    (complementary to provenance-based fault tolerance)

PCC Enabled PRAGMA Cloud



PCC-HTCondor Architecture



Ongoing and Future Work

- Develop a set of application-driven resource allocation strategies and scheduling algorithm based on data locality, sensitivity, etc.
- Extend the Hierarchical MapReduce model to support sensitive data processing.
- Develop a provenance-based fault-tolerance model to handle long-run applications.

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