

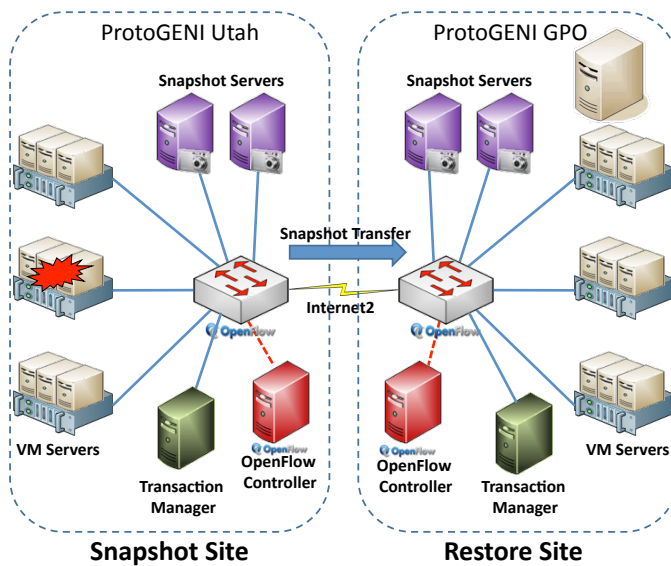
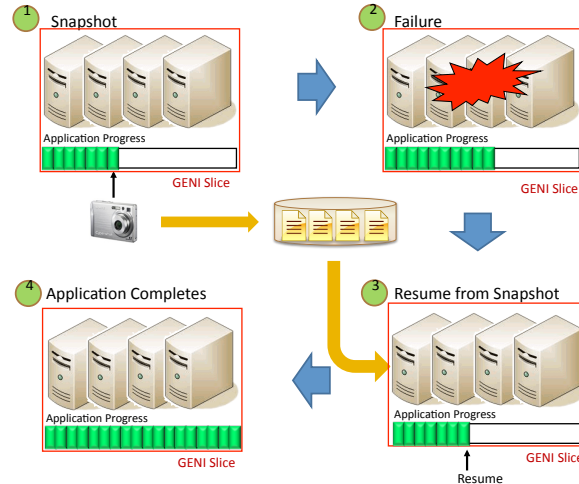
GENI-VIOLIN:

In-Network Suspend and Resume for GENI Experiments

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Introduction

- GENI-VIOLIN provides a **live snapshot capability** to GENI experiments for:
 - **Fault Tolerance**
 - **Debugging**
 - **Slice management**
- Live, In-Network Snapshotting:
 - **Does not interrupt** experiment
 - **Does not require modification** to applications or OS
 - **Preserves consistency** and connection state using algorithm implemented *in the network*



How it works

- **OpenFlow Switches and Controllers**
 - Enforce delivery rules
 - Color packets
 - Buffer and reinject packets (for Mattern's distributed snapshot algorithm)
- **VM Servers** use Xen's *live migration* to copy VM state to Snapshot Servers while VMs continue to run
- **Snapshot Servers** act as migration destinations and store VM images
- A **Transaction Manager** coordinates tasks among VM Servers, Snapshot Servers and OpenFlow Controllers

GEC9 Demo Scenario

- We demonstrate live, in-network snapshot and restore for a distributed ray tracing application running in a ProtoGENI slice:
 1. Live snapshot on ProtoGENI Utah
 2. Snapshot is copied to ProtoGENI GPO
 3. Simulated hardware failure on Utah slice
 4. Snapshot is restored on ProtoGENI GPO
- The **GENI-VIOLIN Dashboard (GUI)** initiates each step and monitors progress
- The **ProtoGENI Visualization System** displays network activity and slice status in real time