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FUTURE INTERNET TESTBEDS
EXPERIMENTATION BETWEEN
BRAZIL AND EUROPE



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Using OFRewind to reproduce network experiments on testbeds

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WHAT IS OFREWIND?

- Software that allows **recording** and **replay** of Openflow traffic within networks.
- It was developed by **Andreas Wundsan** et al, from **Deutsche Telekom Inc.** and **TU-Berlin**.

MOTIVATION

- **Troubleshooting** networks is a **hard task**.
- Networks in a **large scale, wide spread, distributed state**:
 - **Black box** components which are not instrumentable
- Current toolset for troubleshooting is, often, too **coarse grained**:
 - Device mapping
 - Time dilation
 - Trace bisection
- **Replay debugging** could be a solution?

KEY INSIGHTS

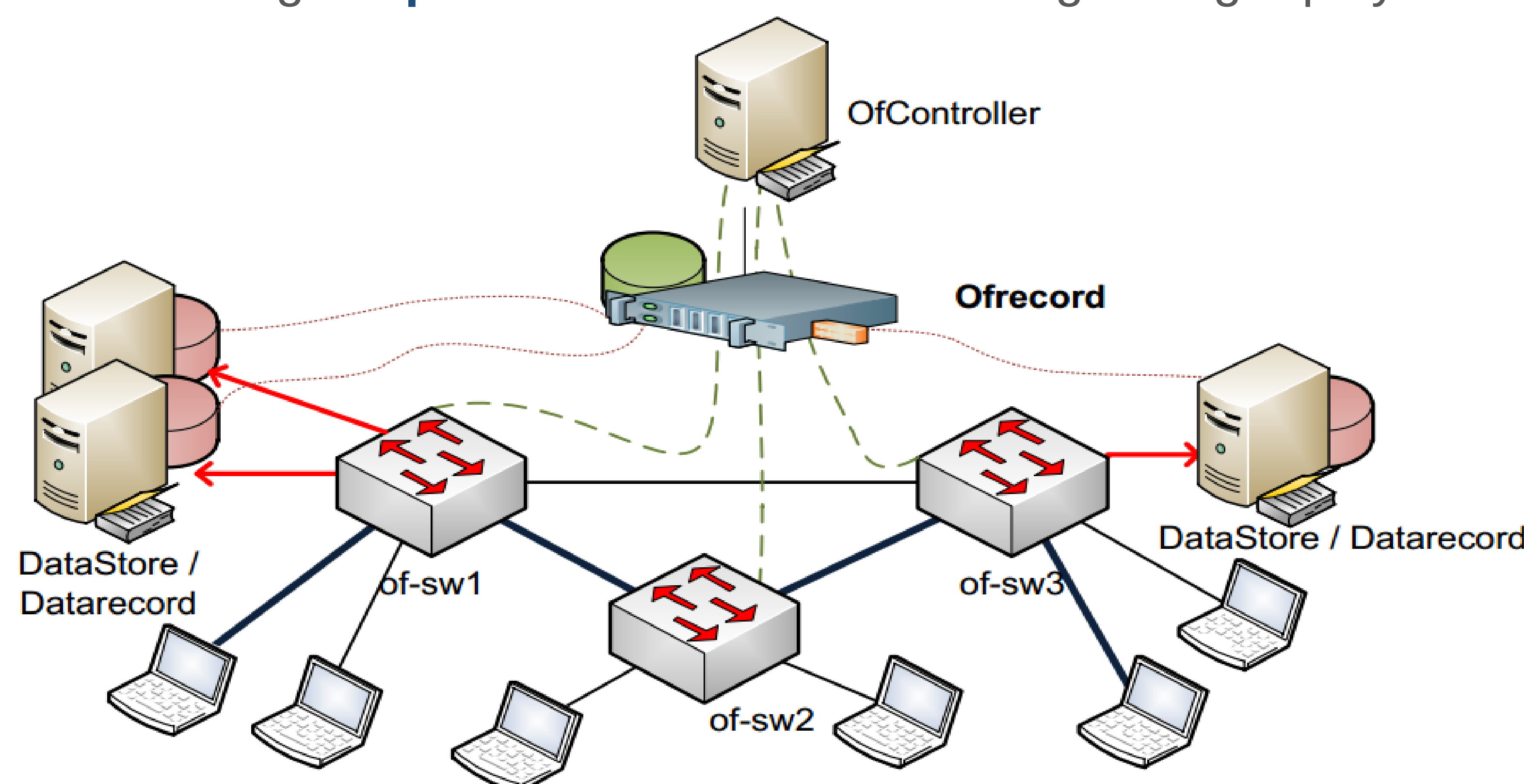
- Not all network traffic is **equal** (Control plane has < 1% traffic and > 90% bugs.)
- Can enable network-wide, consistent Replay Debugging by:
 - **Selective** traffic recording
 - **Separation** of control and data plane recording
- Localizes bugs through:
 - **Device mapping**
 - **Time dilation**
 - **Trace bisection**

OFREWIND APPROACH

- Selects traffic to be recorded:
 - **Always-On** record of OpenFlow control-plane.
 - Dynamic, flexible partial recording of data-Plane (e.g., L3 routing updates)
- After fault occurrence, reinjects events into the network.
- Sub-selects recorded control-and-data-plane traffic for fault localization.

SYSTEM ARCHITECTURE

- OFRewind has two main system components: **OFRewind** and **Datastore**
 - Ofrewind acts like a **proxy** between controller and switches for **control-plane** recording and replay.
 - OFRewind orchestrates multiple Datastores for **data-plane** recording and replay.
 - OFRewind maintains **global ordering** of all flows observed in network.
 - OFRewind allows **precise time-control** over replay pace, ensuring the **preservation** of flow ordering during replay.



FUTURE WORKS

- We from UFSCar, expect to integrate **OFRewind**'s traffic **recording** and **replay** functionalities into **OFELIA CF**.
- Such an addition would allow **OFELIA CF** to **reproduce network experiments** within the testbed environment it controls, and, analogous to OFRewind's original proposal, troubleshoot networks controlled by **OFELIA CF**.