# Master Thesis Project

# E-FDIR System for Complex Network Structures

## A Framework for Efficient Fault-Detection, Isolation and Recovery (E-FDIR) in Datacenters

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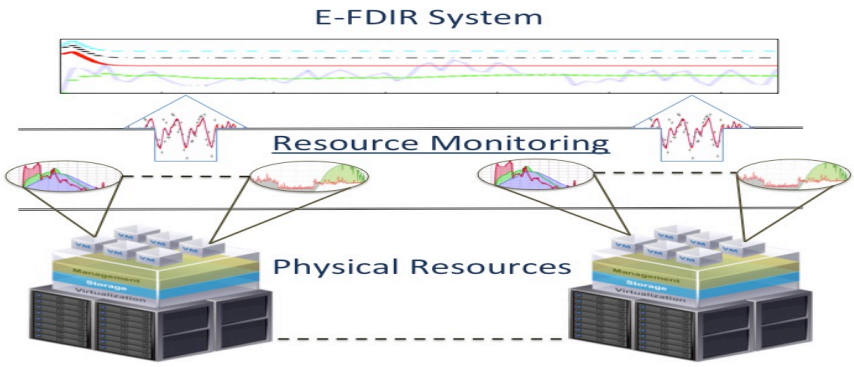
Datacenters have been playing a critical role in IT infrastructures. In recent years, companies like Amazon, Google, Facebook and even academia have developed massive facilities to provide on-demand and seamless access to large amount of resources The guarantee of high availability of services is the core of datacenter's business model. It requires mechanisms to address challenges ranging from low-level hardware failures to disruption of high-level software communication in the system. Number of tools and techniques have developed to address the challenges of efficient fault-detection, isolation and system recovery. Such techniques involve creating virtual groups of resources, known as zones; continued monitoring; running fault detection analysis and taking system backups. The growing number of resources in datacenters accumulates massive amount of monitoring data per day. Such large datasets are very useful for holistic resource management and future strategies but are inadequate to enable real-time decisions. Thus, it is required to further explore efficient mechanisms for fault-detection, isolation and real-time recovery of services in datacenters.




FDIR (Fault Detection, Isolation and Recovery) is a well-known terminology in Control Engineering. FDIR systems identify the fault; isolate the unstable components and recover the system in steady state. Often used in mission critical scenarios. In this project, the task is to explore state-based models for enhanced support of Service-Level-Agreements (SLA) in complex network structures such as datacenters. The state-based modeling techniques are efficient, dynamic and tolerant to incomplete or noisy measurements. These characteristics are essential when addressing high availability in datacenters. The scope of this project will confine to real-time fault detection and service recovery with minimal computational cost. The aim is to work with filtering techniques (Kalman or Particle filters) and define a strategy where each node will work autonomously and several such nodes together will be responsible for providing set of services.