Gozal
Technion's Condor enhancements

High availability, Resource Security and Manageability

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Introduction

- Gozal (in Hebrew) - nestling

- Started in 2002 as Condor deployment support project in the Distributed Systems Lab, headed by Prof Assaf Schuster

- Today: projects for undergraduates and graduate students, staff members, growing Condor pool
Our Goals

- Adding functionality to Condor
- Using Condor for teaching real distributed systems
- Using Condor for research
Projects

- Highly Available Condor Matchmaker
- Resource protection - “Resource Body Guard”
- Centralized configuration and management framework
- Completed
  - Centralized policy enforcement
  - Efficient invocation of short data intensive jobs
Highly Available Matchmaker

- Matchmaker is a **single-point-of-failure**
  - Negotiator’s failure - no additional matches will be possible
  - Collector’s failure – negotiator is out of job, tools querying collector won’t work, etc.

- Our goal
  - Negligible throughput degradation in case of failure
Highly Available Matchmaker

- Our solution - Highly Available Matchmaker
  - **Automatic** failure detection
  - **Transparent** failover to backup matchmaker (no global configuration change for the pool entities)
  - **State replication** between primary and backups
  - “**Split brain**” reconciliation after network partitions
How it works – basic scenario

Collector – HAD

Leader – Negotiator

Active Server – Backup Server

I’m alive

Workstation – Startd and Schedd

Collector – HAD

Collector – Backup Server

Collector – Active Server

Workstation – Startd and Schedd
Status and roadmap

- First prototype - April 2004
- Finalizing implementation and testing
- Planned to be released as a part of the next 6.7.X release
- More information:
  http://dsl.cs.technion.ac.il/projects/gozal/project_pages/ha/ha.html
Resource protection - “Resource Body Guard”

- The problem we want to solve
  - Malicious job can render a resource unusable or obtain private information
  - Condor can be exploited for distributed attacks on other systems

- Solution – resource protection sandbox
  - Auditing of file system and network access, OS resources
MS Windows FS RBG

Design Overview

- Implemented as **standard FS driver**
- **Intercepts** all low level **accesses** to the **hard drive** [very low overhead]
- Normally lets all accesses through
- When Condor invokes a job – reliably loads “firewall” and **denies unauthorized accesses** to FS performed by the job
- When Condor job completes – reliably **unloads** the “firewall”
Status and road map

• Today
  - FS driver coding done
  - integration with Condor and extensive testing pending

• Expected release of beta – Spring, 2005 (check our website)

• Future directions
  - Maximum throughput restrictions and quotas
  - Network RBG
Centralized configuration framework

- “The flipside of Condor flexibility is complexity”
- Lack of centralized pool configuration
  - Editing multiple copies of configuration files is error-prone
- System administrator should learn Condor internals to configure Condor pool
- Owners require simple set-and-forget
Centralized configuration framework overview

- **Centralized DB** for pool configurations
  - Resources pull the updates
- **Unified GUI** for pool management
- **Configuration elements** abstraction (define once, use many)
  - Functional change to Condor configuration, i.e.
    “Allow_User_On_Resource(UserName)”
- **Resource configuration groups**
  - Resource can be a member of one or more groups
  - Resource inherits configuration from the groups of which it is a member
Status and road map

• Today
  - Hierarchical groups management and GUI coding done

• Expected beta release
  - Winter 2005
Collaboration with Condor team

- Generous support from the Condor team
  - We visited UW
  - Prof. Livni visited Technion
  - Source code made available, access to CVS granted
  - Access to UW pool granted
  - Very open and friendly atmosphere
Summary

- We are developing addons for Condor
- We work in tight collaboration with the Condor team
- Some of the projects already have the deliverables available in beta
- The work is in progress by staff members to make releases stable
Do you want to try it?

- This work would not be possible without
  - Prof Schuster, Eran Issler, Noam Palatin and all the undergraduate students who worked on these projects

and of course the Condor team and Prof Miron Livni

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THANK YOU