IIS Sustainability – Infrastructure and Operational Considerations

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Presentation Goals

- Take a look at infrastructure and understand role and risk points related to sustainability
- Discuss some tools for monitoring key IT components
- Operational considerations for a high-demand IIS
- Ongoing recommendations for a sustainable future

The successes of IIS over the years have placed higher demand on the immunization data for external systems and consumers.

This is only increasing…and infrastructure is key to sustaining the demand and success of IIS for the future.

Infrastructure vs. IIS Functional Demands

IIS Infrastructure

VTrcks

Data Analytics

Meaningful Use

2D Barcodes

IIS Enhancements

Infrastructure Points of Failure

- Network Capacity
- CPU Capacity
- Memory Capacity
- Storage Capacity
- Physical Device Failures (Network devices, server components, etc)

Let’s examine each of these areas for understanding and strategies

Network

- Understand your IIS Network
  - Engage your IT partner
  - Understand ISP, bandwidth, usage
- Communicate IIS Requirements
  - Current and future usage volumes
  - Incoming and outgoing data volumes
- Understand/develop IT Network Service Level Agreements
  - Performance expectations
  - Maintenance expectations

Note: Network may be the area you have the least control (i.e. security policies, leveraged environments)

CPU Capacity

- CPU Utilization Percentage vs. CPU Load
  - % focuses on amount of time processes active on CPU
  - Load includes all CPU demand (active and waiting processes)
- Capture trending of CPU Load over time
- Correlate response time to CPU Load
  - General rule: Load average that is 4 times the number of available CPUs will result in sluggish performance
- Understand ability to add CPUs to current infrastructure and impacts on 3rd party software licensing

Memory

- Memory Swapping
  - When the processes running on your server attempt to allocate more memory than your system has available, the kernel begins to *swap* memory pages to and from the disk
  - Frequency of swapping indicates either need for increased memory or more efficient use of available memory
- Identify trends and top memory utilizing processes

Storage Capacity (Data)

- Focus Areas:
  - Identifying growth trends
  - Available storage
  - 85% Rule (take action – urgency based on total space)
- Know what it takes to get more storage based on your storage solution
- Keep a ‘clean closet’…make the most of your storage
  - Archiving
  - Removing unnecessary files

Physical Device Failures

- Understand your ‘IT Insurance’ – Manufacturer Support Levels
  - On-site technical support
  - Warranties - device replacement

Now What???...Failover/Disaster Recovery Alternatives…

Failover versus Disaster Recovery

- Failover is a methodology to resume system availability in an acceptable period of time, while disaster recovery is a methodology to resume system availability when all failover strategies have failed.

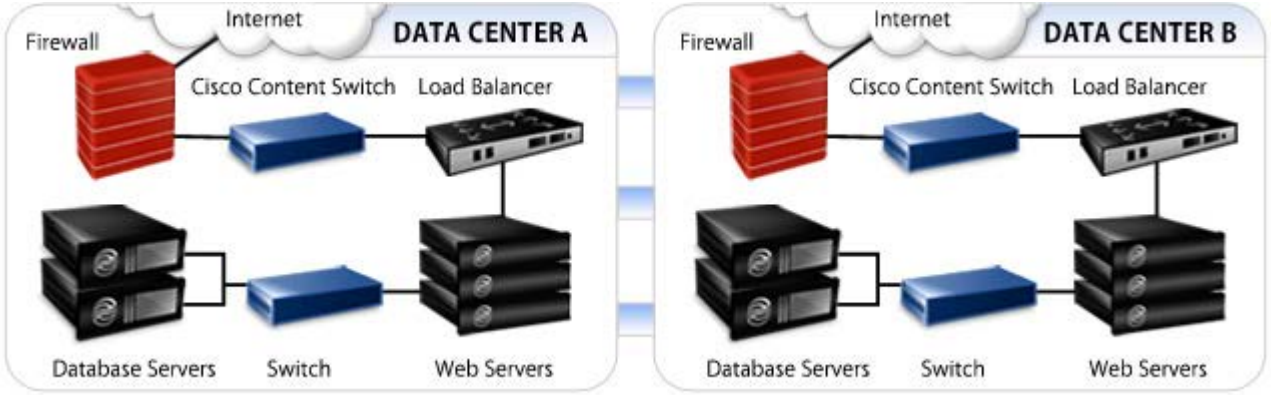
Failover Approaches

Approach	Recovery Time	Expense	User Impact
No Failover	Unpredictable	No cost to low cost	High
Cold Failover	Hours - Minutes	Moderate	Moderate
Warm Failover	Seconds	Moderate to high	Low
Hot Failover	Immediate	Moderate to high	None

Failover is NOT Disaster Recovery

As typically failover solutions are in the same network and hosting facility

Disaster Recovery (DR)



- Have an accurate DR plan including responsibilities for all your IT stakeholders and partners
- Keep plan updated and run tests annually
- Understand length of downtime your plan exposes you to…

A Few DR Questions for thought.

Who restores the application?

Who is responsible for the web site domain?

Where is the DR location?

Do I have DR hardware?

Who is responsible for maintaining/procuring that hardware?

Who is building and maintaining the DR servers?

How will the back-ups get to the DR servers?

Who builds the databases?

Who is responsible for restoring the data?

Where are the data back-ups?

What about application back-ups?

Who initiates DR Plan?

How long will I use this environment?

What is potential data loss?

The 24x7x365 IIS – Operational Considerations

- Understand service levels for application support for ‘off hours’ and set expectations with stakeholders appropriately.
  - Note: Higher support levels typically translate to higher cost.
- Re-evaluate release/maintenance window timing (early a.m./weekends)
- Availability of IIS decision makers on off-hours
- Communication strategies – planned/unscheduled downtime
- Data Exchange – holding messages/stakeholder notification

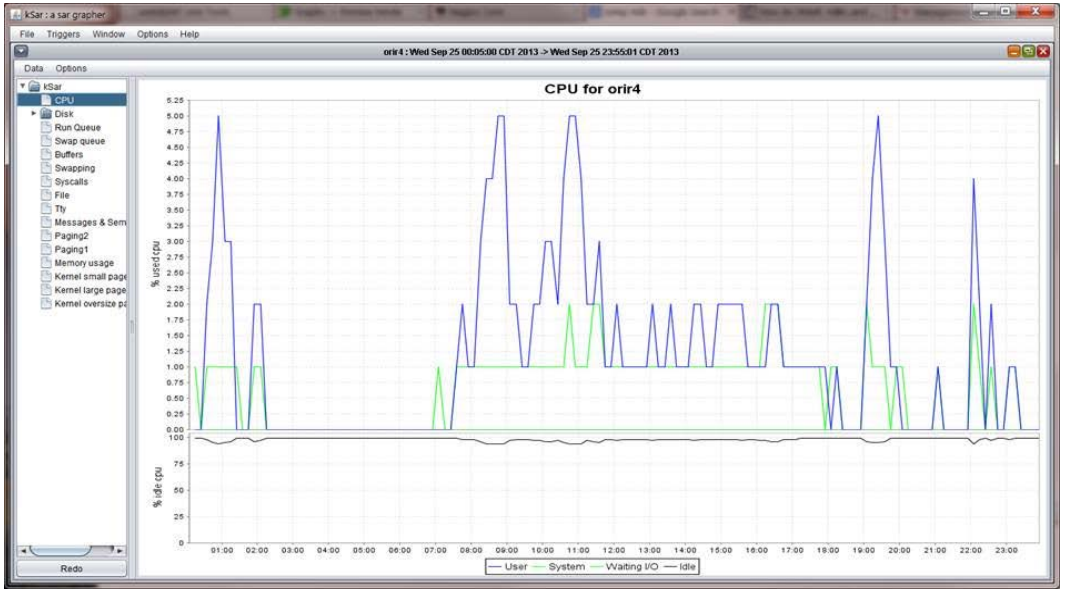
What's Right for Me? Identify Risk Tol

- Know the risks you are operating under, identify:
  - Risk Areas
  - Probability
  - Impact
  - Mitigation Strategy
- Inform IIS Stakeholders of Risk Plan
  - Program/Project Leadership
  - CDC
  - IIS/IT Partners

Note: Risk is a balance. Higher availability – less risk – usually translates to higher investment in IT.

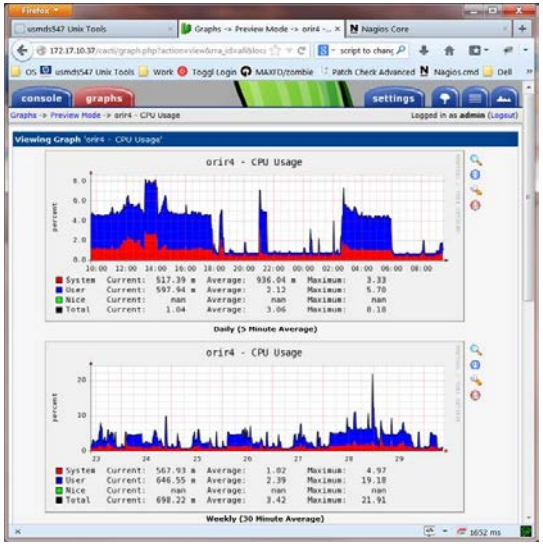
Monitoring Tools

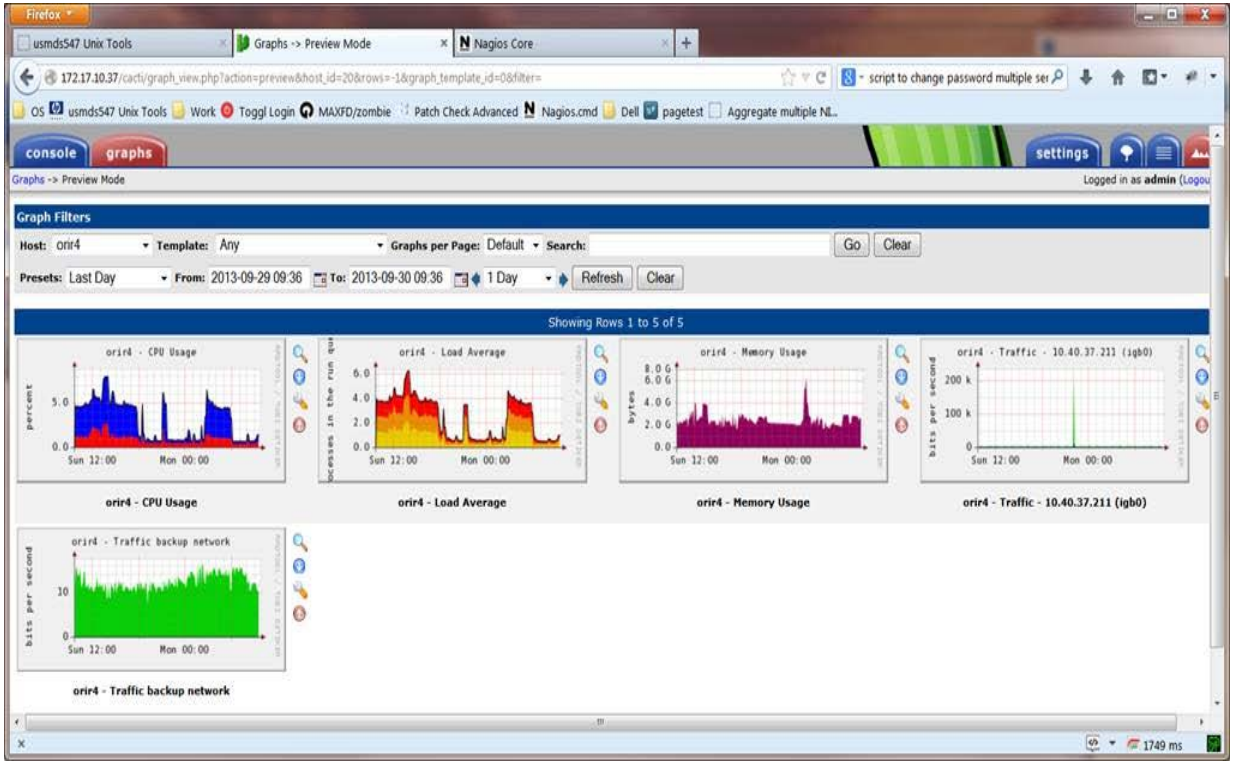
- Operating System (OS)/System Administrator (SA) Tools
  - Task Manager Programs (i.e. top) – Orders processes by CPU/memory demand
  - vmstat – Virtual Memory Statistics
  - SAR – System Activity Reports
  - Ksar – graphing tool



Application/Infrastructure Monitoring - Cacti

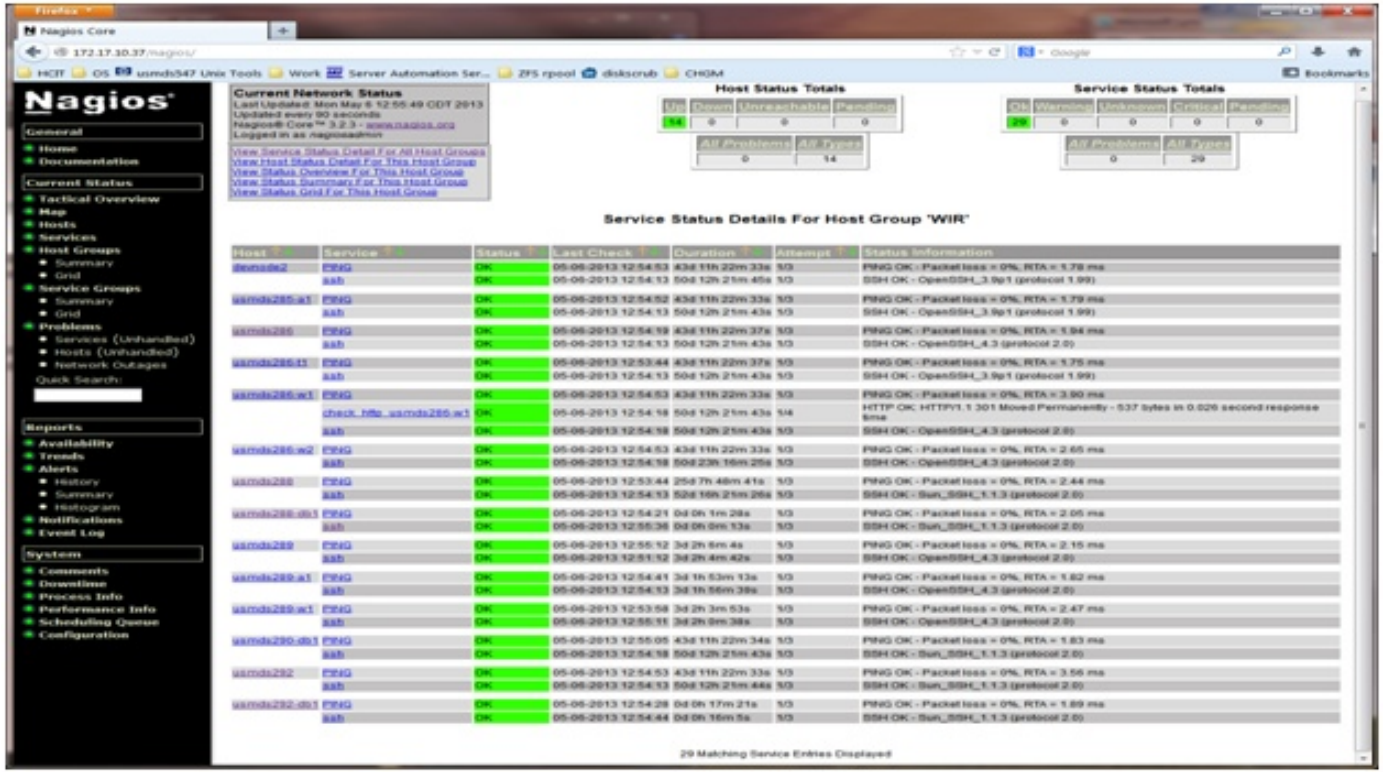
Open source network and device graphing solution.





Nagios Core

Open source IT infrastructure monitoring



Other Tools

- Monitoring
  - Custom Scripts
  - AWStats – Application usage/browsers
  - Trial Versions
  - Check IT Enterprise Agreements
- Load and Capacity Testing
  - SOAP UI
  - JMeter
- Others
  - Security
  - Code Optimization Tools

Bottom Line On Tools…

- ‘Perfect/Must Have’ tool doesn’t exist
- IT *Support and Approval* for all software
- Have something for monitoring IIS usages of IT resources and availability of your IIS IT resources.

REMEMBER: Issue identified by a tool is a SYMPTOM and MAY NOT be the root cause!

Conclusions

- Evaluate, plan, and communicate your level of risk
- Engage IT as a ***KEY PARTNER*** in your IIS future – Communicate Requirements
- Plan for IT in ***EACH*** IIS enhancement…you are adding load with each modification
- Regular load/performance testing (i.e. release of new functionality)
- Monthly IT reports (i.e. CPU, memory, storage, network, etc.), establish trend data points
- Focus on SLAs understanding and balancing cost, benefit, and risk
- IT planning and maintenance (i.e. patching and monitoring) is equally (if not more) important as IIS functionality. Without adequate infrastructure, there is no IIS.

Remember – IT needs are IIS project specific…only you can identify

Understanding and planning for IT provides a clear view of the ‘Mountains’ ahead allowing action to meet those challenges for a successful and sustainable IIS future.

THANK YOU!!!