



PRESENTS

NETWORLD INTEROP



Authentic Problems™: A Better Approach to Root Cause

Shaula Alexander Yemini

President

September, 2001

The Challenges of Root Cause Analysis

- Ability to analyze any problem that matters
 - Brownout
 - Configuration problem
 - Performance degradation
 - Resource contention
 - Security violation ...
- Adaptability: every environment is different
- Automation: people can't correlate fast/well
- Extensibility: new technologies = new problems

Wanted: A Better Approach To Root Cause Analysis

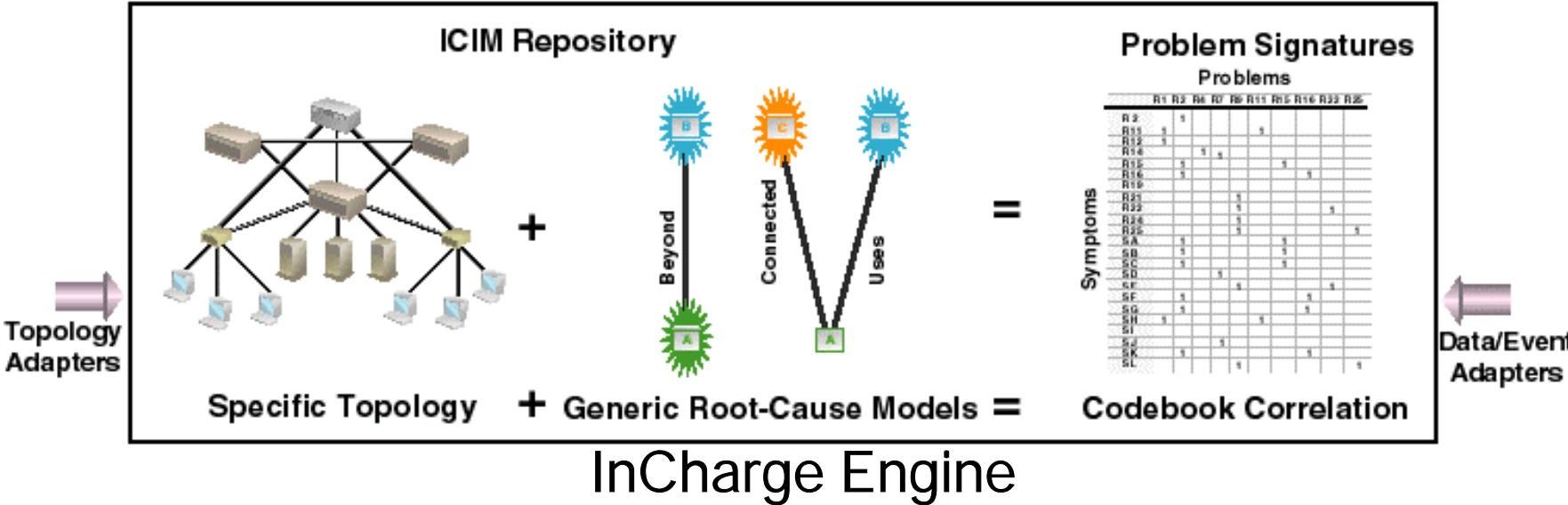
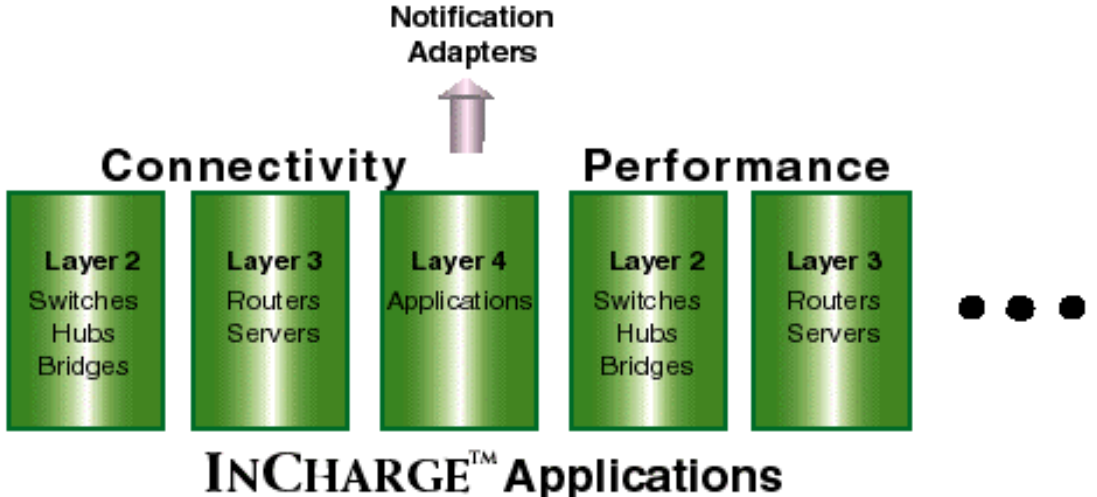
SMARTS InCharge™ Approach

Each problem has a unique **Signature** – its symptoms

- SMARTS starts with **Authentic Problems™**
- Codifies their behavior in generic **Behavior Models**
- Automatically applies models to discovered objects to create **Problem Signatures**
- Automatically matches signatures to symptoms to diagnose authentic problems
- Automatically computes business impacts

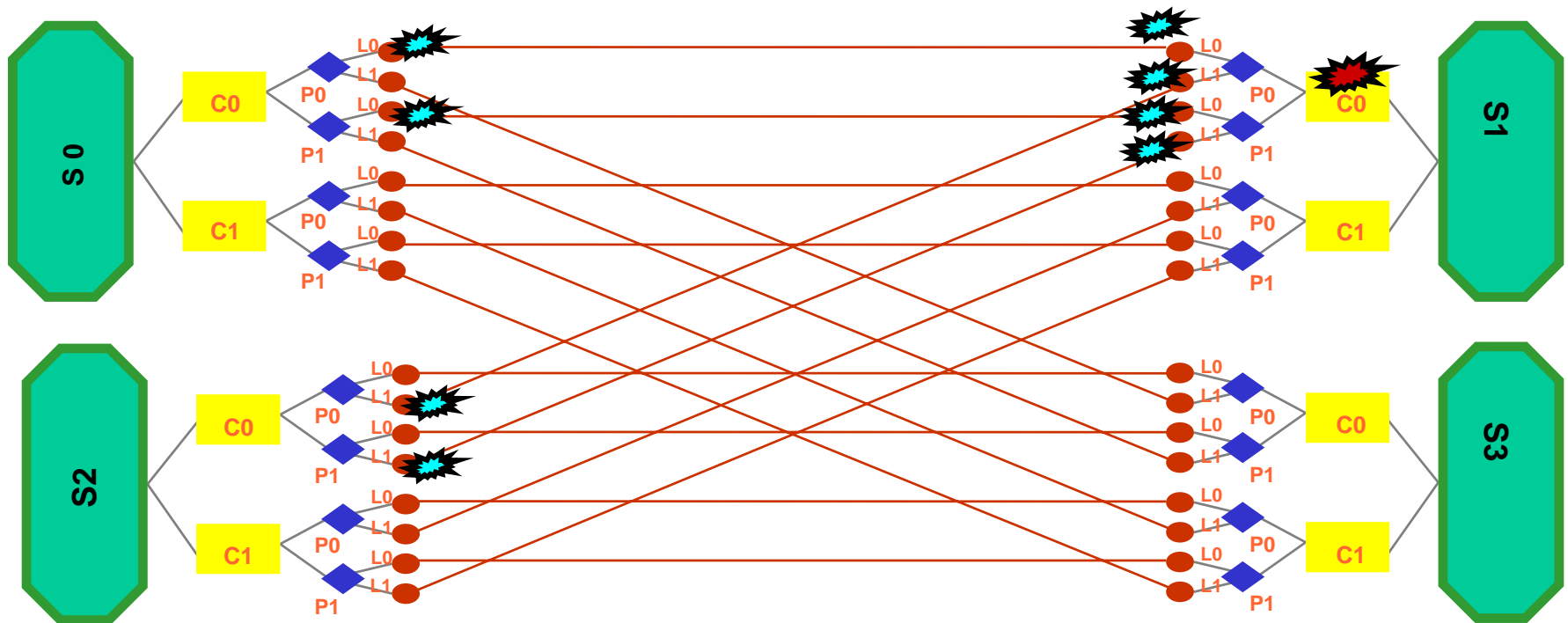
Builds on patented **Codebook Correlation Technology™**

InCharge Architectural Components



Example of a Signature

- Card 0 in Switch 1 fails
 - s1c0 down signature: {s1c0p0l0, s1c0p0l1, s1c0p1l0, s1c0p1l1, s0c0p0l0, s2c0p0l1, s0c0p1l0, s2c0p1l1} operationally down



Example Behavior Models

Switch Model

Problem Down Causes *ConnectedPortDown*

Propagated symptom *ConnectedPortDown To Cards in the Switch*

Card Model

Problem Down Causes *PortDown*

Propagated symptom *PortDown To Physical Ports in the Card are Down*

Propagated symptom *ConnectedPortDown To Physical Ports in the Card*

Physical Port Model

Problem Down Causes *PortDown*

Propagated symptom *PortDown To Logical Ports Layered over the Port are Down*

Propagated symptom *ConnectedPortDown To Layered over Logical Ports*

Logical Port Model

Problem Down Causes *OperationallyDown , ConnectedPortDown*

Local symptom *OperationallyDown*

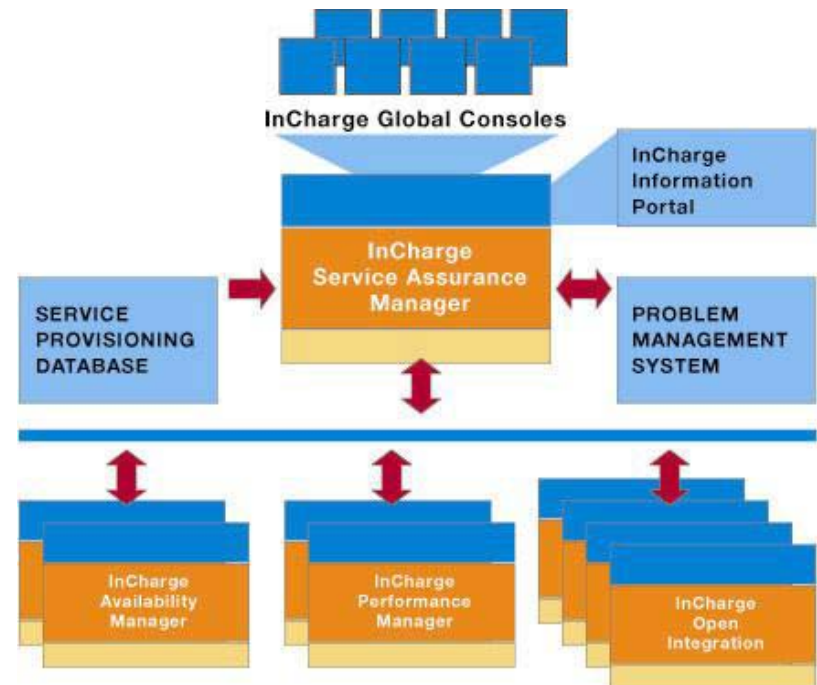
Propagated symptom *ConnectedPortDown To Connected Logical Ports are Down*

InCharge Technology Advantages

- Future-proof foundation for automation
- Applies to any type of problem in any technology
 - Any logical or physical object
 - Any domain: network, system, application, service
- Intelligent analysis automatically adapts to managed environment
- Blazingly fast distance computation
- Hyper-accurate, even with symptom delay or loss

InCharge Application Features

- New application = a new model library
- Auto-discovery of logical and physical objects
- Graphical visualization system™
- Integrated solutions on common platform
- Distributed architecture



InCharge Auto Discovery

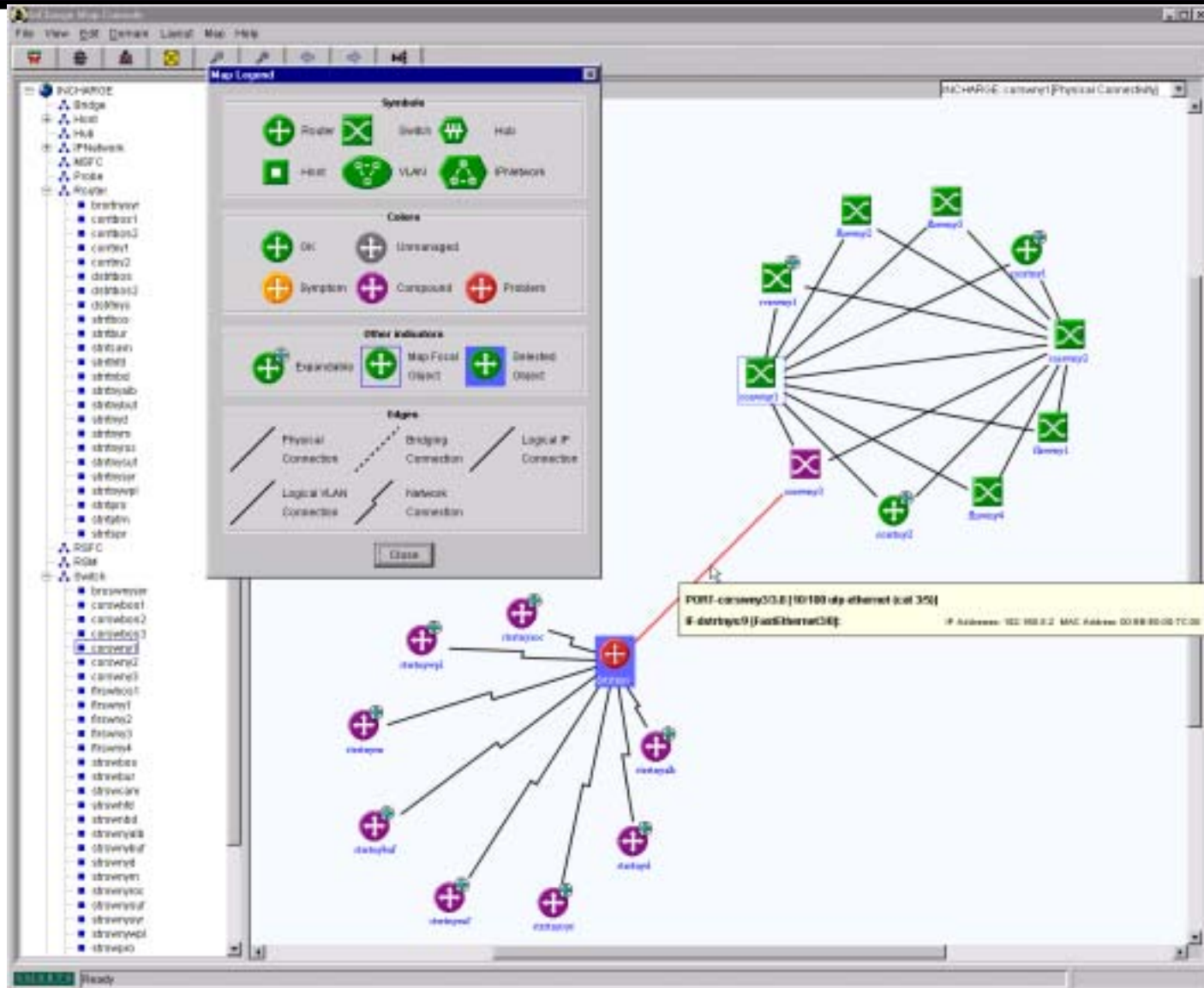
The screenshot displays the InCharge Administration Console interface. The top window shows the 'Domain INCHARGE' configuration for auto-discovery. The left pane shows a tree view of the network topology under 'RSM', including various switches and hosts. The main window has tabs for 'Correlation', 'Modules', 'Threads', 'Topology', and 'Discovery Filters'. The 'Discovery Filters' tab is active, showing filters for IP Address Range (192.168.100-150*), System Name (*), and System Description (*). A 'System Types' dropdown menu is open, showing 'Host', 'Hub', and 'MSFC'. Below the filters are 'Add', 'Apply', and 'Refresh' buttons. A table below the filters shows the current discovery results:

IP Addr	System Name	System Type	Description	Options
192.168.100-255*	*	Router Switch	*	AUTOMATIC
192***	*	Host	*	AUTOMATIC

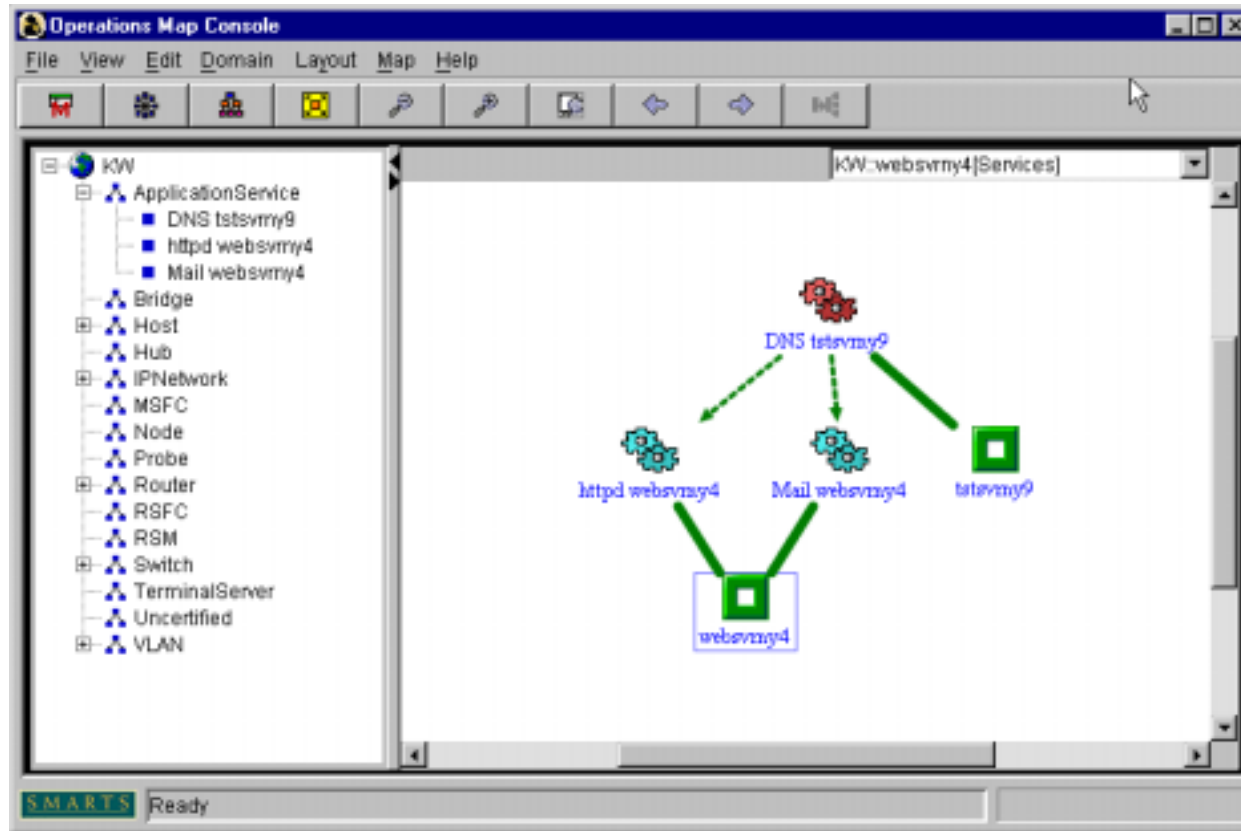
The bottom window shows the 'Alarm Log' table, which lists various system events. The table has columns for Class, Name, Event, Severity, Count, Last Change, First Node, and Domain. The events are color-coded: red for 'Problem', yellow for 'Symptom', and purple for 'Completed'.

Class	Name	Event	Severity	Count	Last Change	First Node	Domain
VLAN	VLAN-DefaultVLAN	ConnectivityException	99%	1	00:06:33	21 Feb 18:58:57	INCHARGE
VLAN	VLAN-WER0ring	ConnectivityException	99%	1	00:06:33	21 Feb 18:58:57	INCHARGE
VLAN	VLAN-StorePOS	ConnectivityException	99%	1	00:06:33	21 Feb 18:58:57	INCHARGE
Switch	swswt01	Down	99%	1	00:06:33	21 Feb 18:58:57	INCHARGE
Host	pdswm3	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	pdswm2	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	pdswm1	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	welwrm4	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	welwrm3	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	welwrm2	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	welwrm1	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.15 [pdswm3]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.13 [welwrm4]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.12 [welwrm3]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.11 [welwrm2]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.14 [pdswm1]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.18 [welwrm1]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
IP	192.168.7.22 [pdswm2]	Unresponsive	100%	1	00:07:03	21 Feb 18:58:55	INCHARGE
Host	tdswm6	Unresponsive	100%	1	00:07:02	21 Feb 18:58:56	INCHARGE
Host	tdswm7	Unresponsive	100%	1	00:07:02	21 Feb 18:58:56	INCHARGE
Host	tdswm8	Unresponsive	100%	1	00:07:02	21 Feb 18:58:56	INCHARGE
Host	pdswm5	Unresponsive	100%	1	00:07:02	21 Feb 18:58:56	INCHARGE

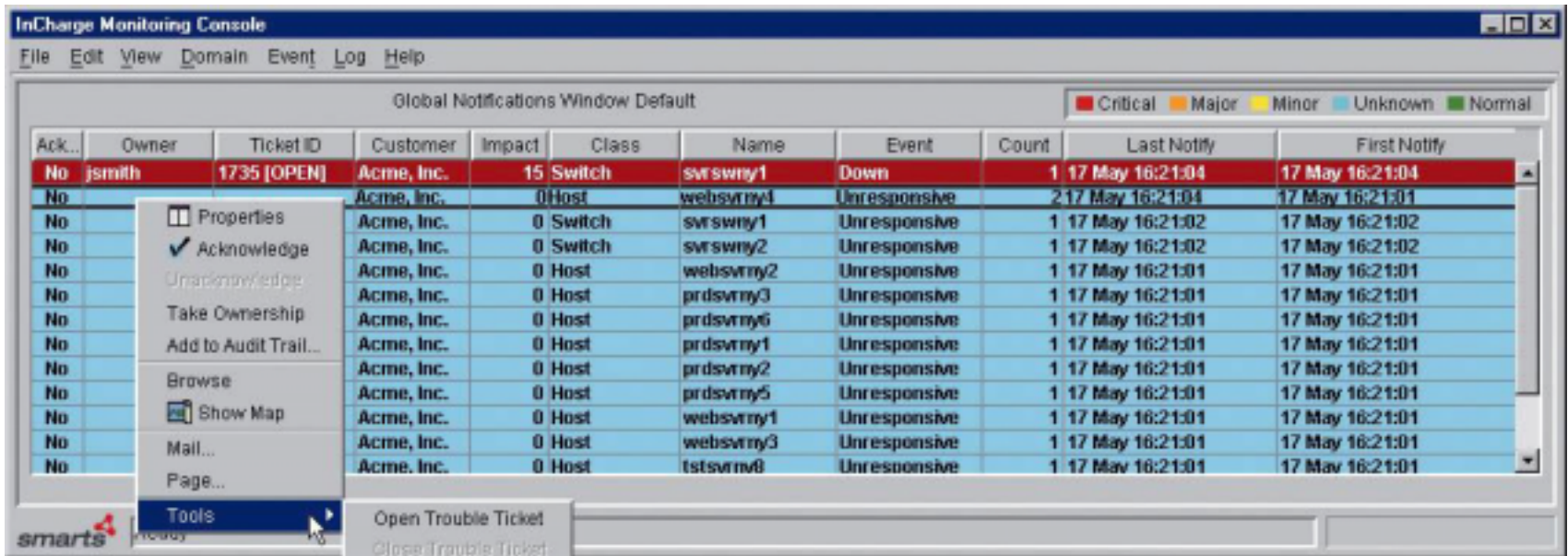
InCharge Graphical Visualization



InCharge Service Views



Manage Problems in A Business Context



The screenshot shows the InCharge Monitoring Console interface. At the top, there is a menu bar with 'File', 'Edit', 'View', 'Domain', 'Event', 'Log', and 'Help'. Below the menu bar is a title bar for the 'Global Notifications Window Default'. A legend indicates severity levels: Critical (red), Major (orange), Minor (yellow), Unknown (light blue), and Normal (green). The main area contains a table with columns: Ack..., Owner, Ticket ID, Customer, Impact, Class, Name, Event, Count, Last Notify, and First Notify. The first row is highlighted in red, indicating a Critical event. A context menu is open over this row, showing options like Properties, Acknowledge, Unacknowledge, Take Ownership, Add to Audit Trail..., Browse, Show Map, Mail..., Page..., and Tools. The Tools menu is currently selected, showing 'Open Trouble Ticket' and 'Close Trouble Ticket' options.

Ack...	Owner	Ticket ID	Customer	Impact	Class	Name	Event	Count	Last Notify	First Notify
No	jsmith	1735 [OPEN]	Acme, Inc.	15	Switch	svrswrn1	Down	1	17 May 16:21:04	17 May 16:21:04
No			Acme, Inc.	0	Host	websvrn4	Unresponsive	2	17 May 16:21:04	17 May 16:21:01
No			Acme, Inc.	0	Switch	svrswrn1	Unresponsive	1	17 May 16:21:02	17 May 16:21:02
No			Acme, Inc.	0	Switch	svrswrn2	Unresponsive	1	17 May 16:21:02	17 May 16:21:02
No			Acme, Inc.	0	Host	websvrn2	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	prdsvrn3	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	prdsvrn6	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	prdsvrn1	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	prdsvrn2	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	prdsvrn5	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	websvrn1	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	websvrn3	Unresponsive	1	17 May 16:21:01	17 May 16:21:01
No			Acme, Inc.	0	Host	tstsvrn8	Unresponsive	1	17 May 16:21:01	17 May 16:21:01

- Authentic problems correlated to service, customer, trouble ticket
- Automated Impact Analysis uses predefined or user-defined formulas
- Pull down menu for interactive command and control, audit trail
- One click drill down to details
- Automated filtering, prioritizing, aging, matching alarms to clears

SMARTS Puts You InCharge!

- Starting with problems is key to automated analysis
- Automatic adaptability to change
- Future-proof foundation with behavior models
- Speed, Scalability & Accuracy
- Immediate ROI with Instant Results Technology™

Any Problem, Any Object, Any Topology