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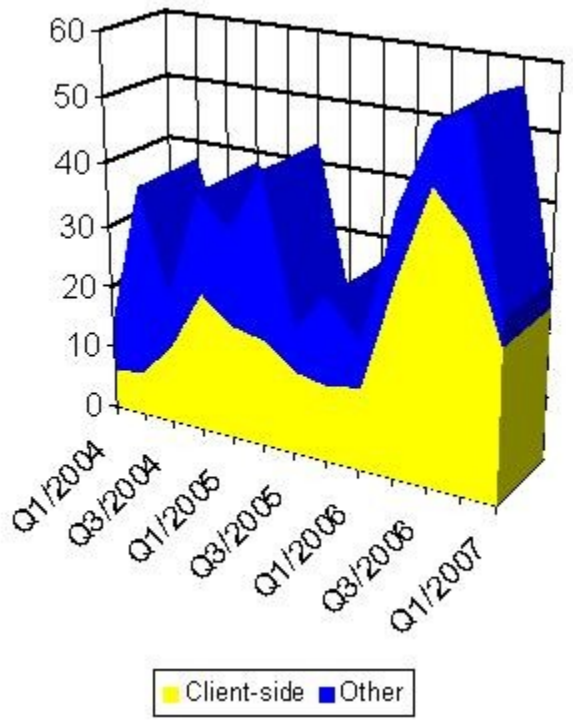
# Vulnerability Landscape

- In 2006 the patches for client-side vulnerabilities overcame other categories in Microsoft software.

- In 2010, Symantec's *Global Internet Security Threat Report* indicated that over 93% vulnerabilities exploited worldwide are now client-side




Source: http://www.symantec.com

# Protecting the Client

- Client-side attacks have special properties compared to traditional server-side attacks
  - Extremely complex structures for document formats
  - Embedding of interpreters and scripting languages
  - Embedding of arbitrary formats within other container formats
  - Obfuscation techniques
  - Multiple delivery channels for the same vulnerability

# Network Intrusion Prevention Systems

- Intrusion prevention platforms are evaluated by market analysis firms according to two criteria
  - Throughput
  - Coverage
- A key term in modern IPS is deep packet inspection but implementation is practically limited by the main two evaluation criteria
- A supplemental system is required to defend against client side attacks

# Razorback Framework

- Razorback is a distributed data collection and analysis framework
- Modular architecture allows for collection and analysis modules to be distributed over a network in arbitrary configurations
  - Retrieval of data over the wire or from server software after delivery
  - Analysis of complex file formats distributed over a server farm

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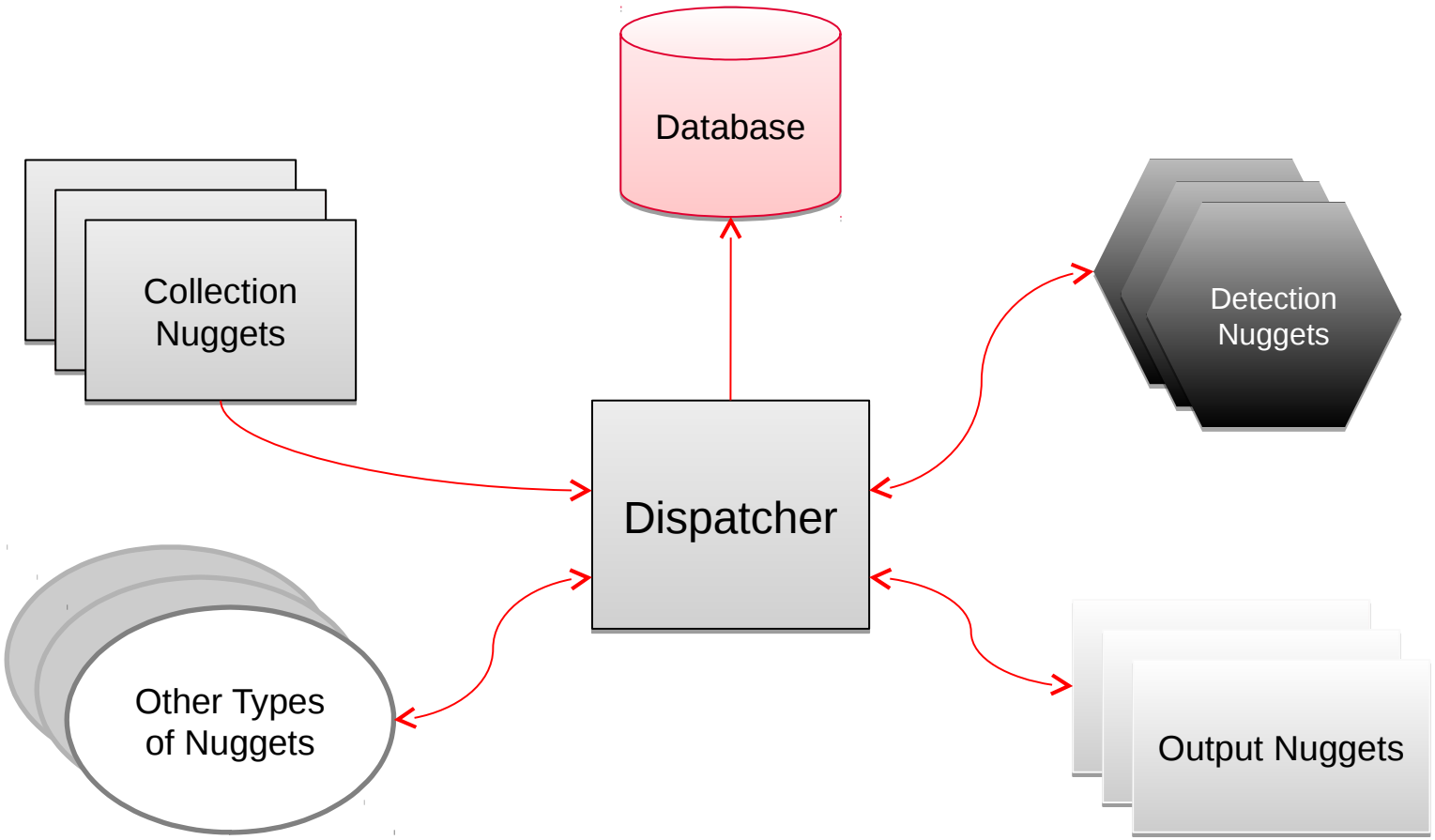
# Razorback Framework

- A collection of elements working together
- Each element performs a discrete task
- Elements are tied together via the Dispatcher
- Nugget types:
  - Data Collection
  - Data Detection/Analysis
  - Output
  - Intelligence
  - Correlation
  - Defense Update
  - Workstation

# Razorback Framework Architecture



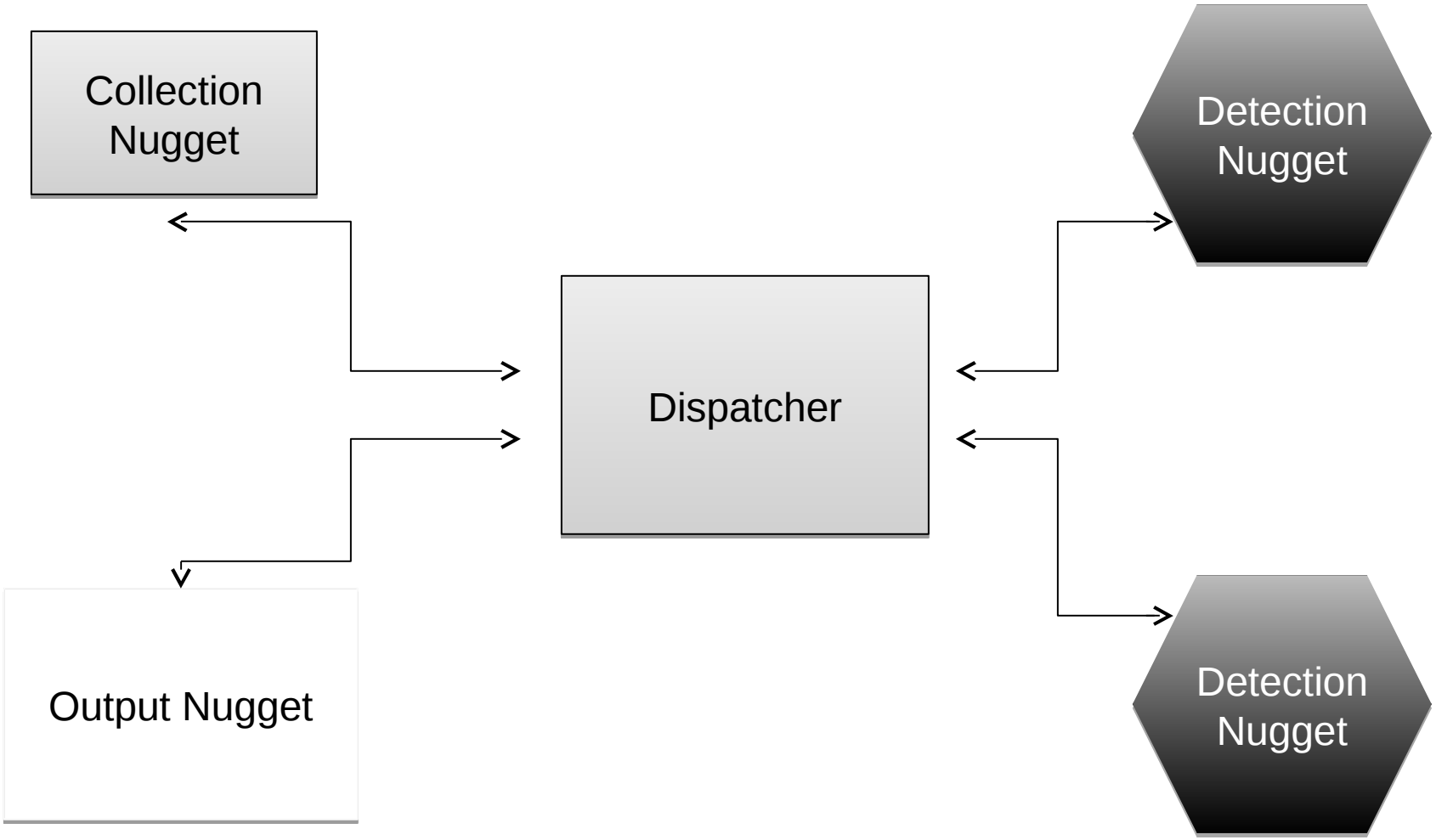
# Database

- Configuration information
- Event information
- Contextual information
- Metadata
- Provides a wealth of information for correlating events and activities

# Nuggets

- Dispatcher Registration
  - Types of data handled
  - Types of output generated
- UUIDs
  - Identifier of nuggets
  - Type of nugget
  - Types of data handled and/or provided
  - Allows for easy addition and removal of elements

# Nugget Registration



# Collection Nugget

- Capture data
  - From the network
  - From a network device directly
  - From log files
- Contact dispatcher for handling
  - Has this data been evaluated before?
  - Send the data to the Dispatcher

# Collection Nuggets

- Snort-as-a-Collector (SaaC)
  - SMTP mail stream capture
  - Web capture
  - DNS capture
- Custom post-mortem debugger
  - Traps applications as they crash
  - Sends the file that triggered the crash to Dispatcher
  - Sends the metadata of the crash to the Dispatcher

# Detection Nugget

- Handles incoming data from Collection Nuggets
- Splits incoming data into logical sub-blocks
  - Requests additional processing of sub-blocks
- Provides alerting feedback to the Dispatcher

# Detection Nuggets

- Zynamics PDF Dissector
  - Deobfuscation and normalization of objects
  - Target known JavaScript attacks
- JavaScript Analyzer (w/ Zynamics)
  - Search for shellcode in unescaped blocks
  - Look for heap spray
  - Look for obvious obfuscation possibilities

# Detection Nuggets

- Shellcode Analyzer (w/ libemu)
  - Detection and execution of shellcode
  - Look for code blocks that unwrap shellcode
  - Win32 api hooking
    - Determine the function call
    - Capture the arguments
  - Provide alerts that include shellcode action

libemu.carnivore.it

# Detection Nuggets

- Office Cat Nugget
  - Full Office file parsing
  - Vuln-centric detection against known threats
- SWF Nugget
  - Decompresses and analyzes flash
  - Detects known flash threats

# Detection Nuggets

- ClamAV Nugget
  - Analyze any format
  - Signature- and pattern-based detection
  - Updatable signature DB
  - Can further serve as a collector
  - Can issue defense updates

# Output Nugget

- Receives alert notification from Dispatcher
- If alert is of a handled type, additional information is requested:
  - Short Data
  - Long Data
  - Complete Data Block
  - Normalized Data Block
- Sends output data to relevant system

# Output Nuggets

- Deep Alerting System
  - Provide full logging output of all alerts
  - Write out each component block
  - Include normalized view of documents as well
- Maltego Interface
  - Provide data transformations targeting the Razorback database

www.paterva.com

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# Analysis Nuggets

- Intelligence Nugget
  - ► Generate metadata for correlation
- Correlation Nugget
  - ► Compare results of various intelligence nuggets

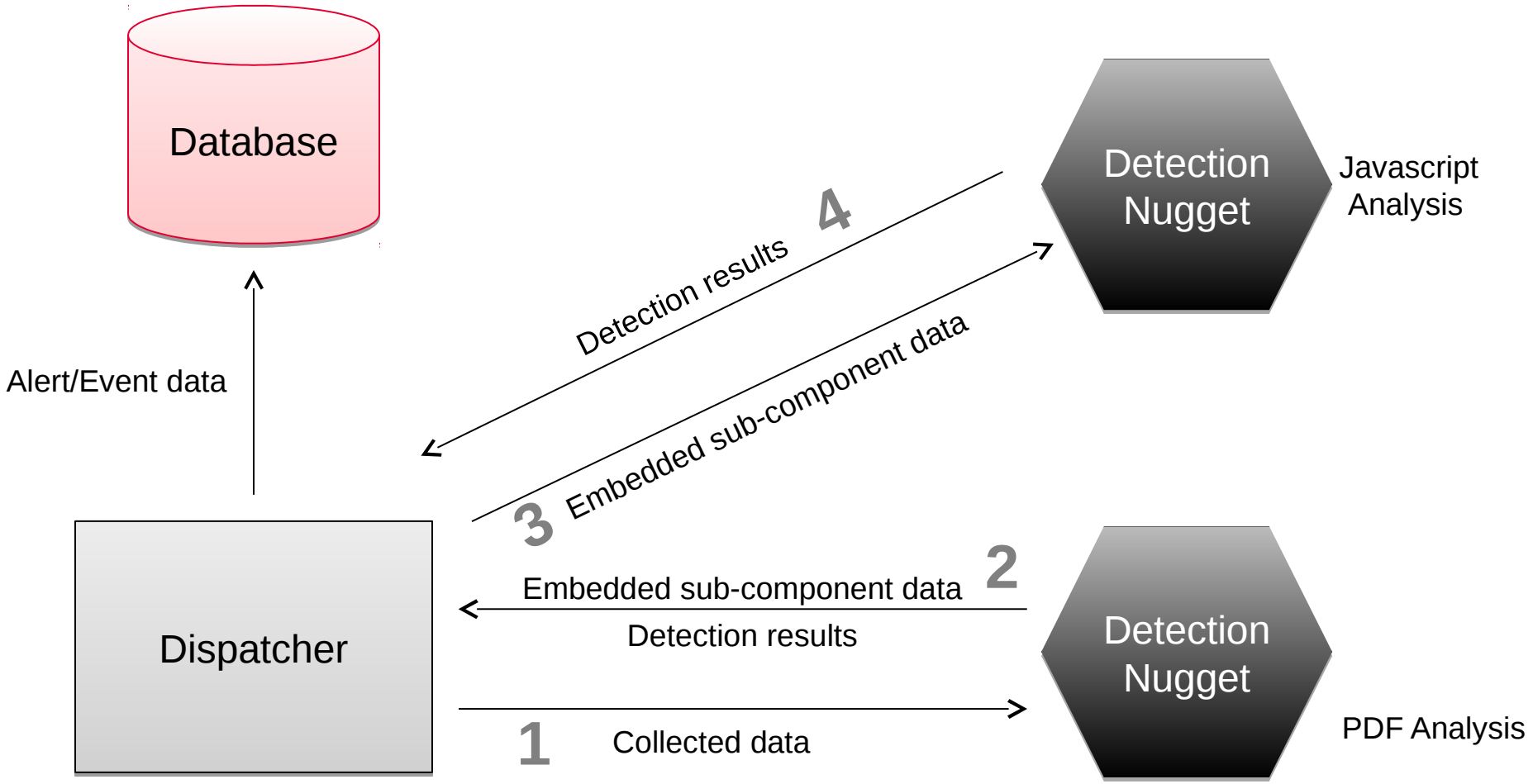
# Defense Update Nugget

- Receives update instructions from dispatcher
- Performs dynamic updates of network device(s)
- Update multiple devices
- Update multiple devices of different types!
- Notifies dispatcher of defense update actions

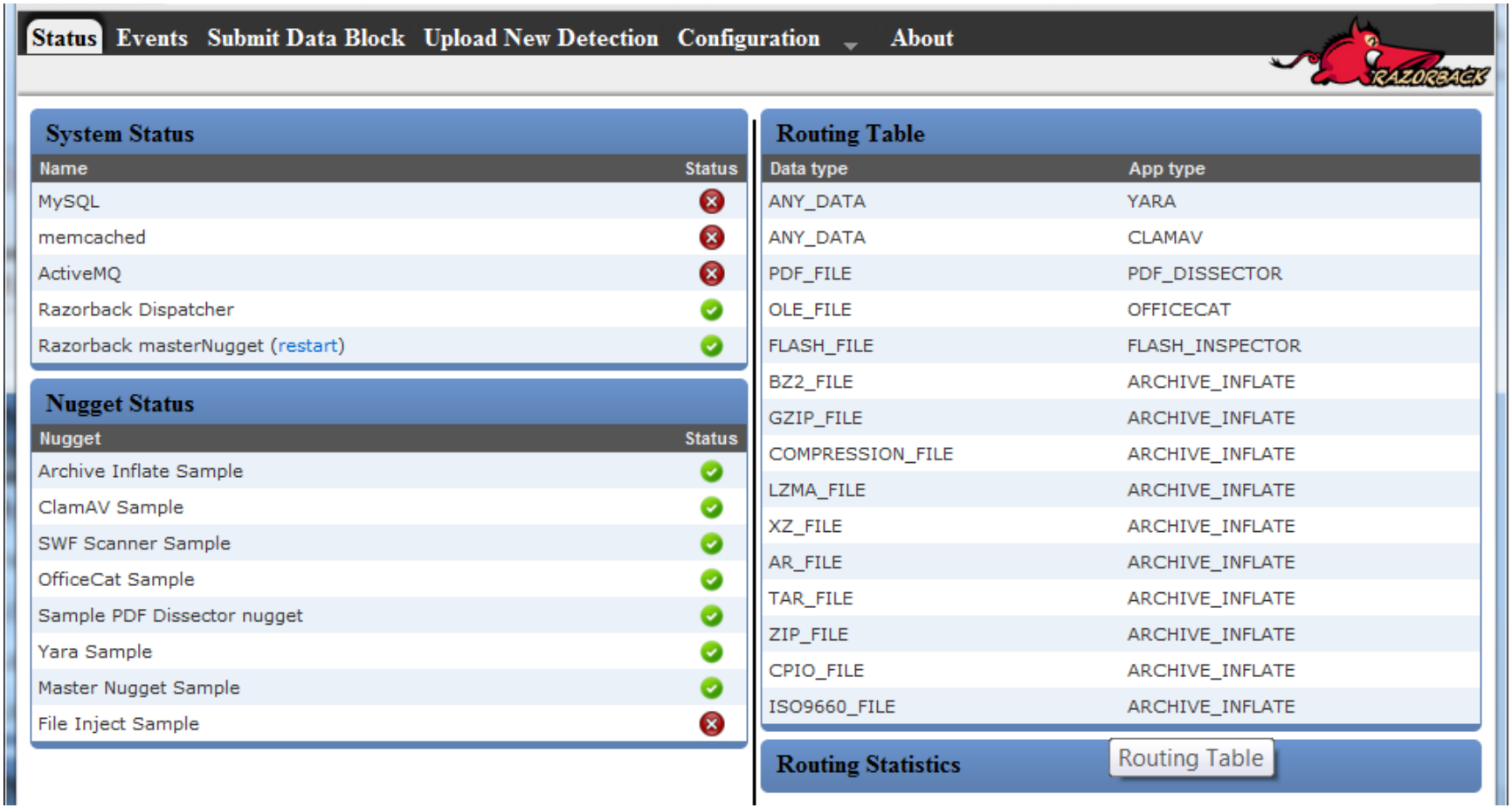
# Workstation Nugget

- Authenticates on a per-analyst basis
- Provides analyst with ability to:
  - Manage nugget components
  - Manage alerts and events
    - Consolidate events
    - Add custom notes
    - Set review flags
    - Delete events
  - Review system logs

# Dispatcher Operation



# DEMO

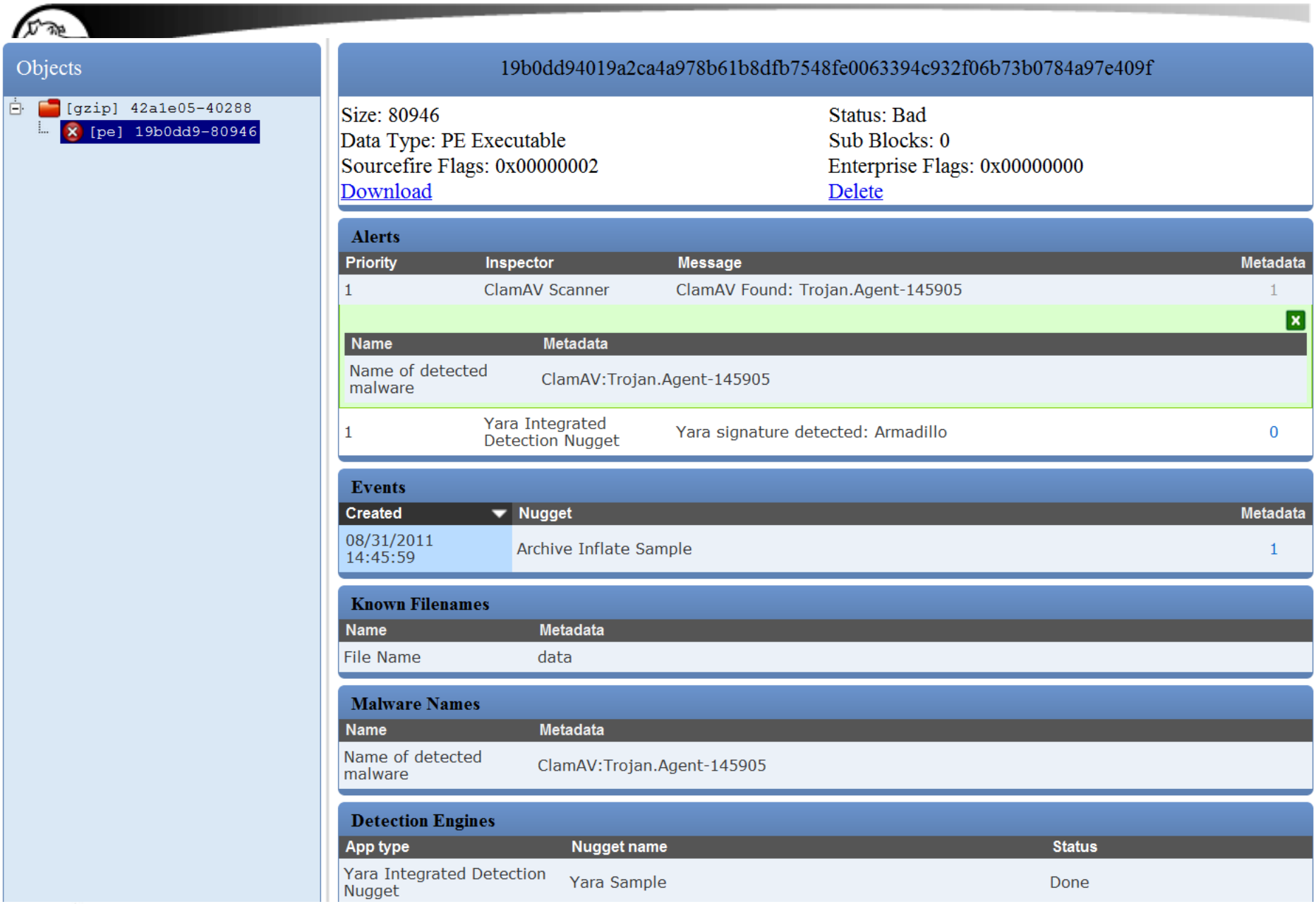

Status
Events
Submit Data Block
Upload New Detection
Configuration
About
RAZORBACK
System Status
Name
Status
MySQL
memcached
ActiveMQ
Razorback Dispatcher
Razorback masterNugget (restart)
Nugget Status
Nugget
Status
Archive Inflate Sample
ClamAV Sample
SWF Scanner Sample
OfficeCat Sample
Sample PDF Dissector nugget
Yara Sample
Master Nugget Sample
File Inject Sample
Routing Table
Data type
App type
ANY_DATA
YARA
ANY_DATA
CLAMAV
PDF_FILE
PDF_DISSECTOR
OLE_FILE
OFFICECAT
FLASH_FILE
FLASH_INSPECTOR
BZ2_FILE
ARCHIVE_INFLATE
GZIP_FILE
ARCHIVE_INFLATE
COMPRESSION_FILE
ARCHIVE_INFLATE
LZMA_FILE
ARCHIVE_INFLATE
XZ_FILE
ARCHIVE_INFLATE
AR_FILE
ARCHIVE_INFLATE
TAR_FILE
ARCHIVE_INFLATE
ZIP_FILE
ARCHIVE_INFLATE
CPIO_FILE
ARCHIVE_INFLATE
ISO9660_FILE
ARCHIVE_INFLATE
Routing Statistics
Routing Table

## Nugget Status

| Nugget | Status |
| --- | --- |
| Archive Inflate Sample | ✓ |
| ClamAV Sample | ✓ |
| SWF Scanner Sample | ✓ |
| OfficeCat Sample | ✓ |
| Sample PDF Dissector nugget | ✓ |
| Yara Sample | ✓ |
| Master Nugget Sample | ✓ |
| File Inject Sample | ✗ |

**Routing Table**

| Data type | App type |
|---|---|
| ANY_DATA | YARA |
| ANY_DATA | CLAMAV |
| PDF_FILE | PDF_DISSECTOR |
| OLE_FILE | OFFICECAT |
| FLASH_FILE | FLASH_INSPECTOR |
| BZ2_FILE | ARCHIVE_INFLATE |
| GZIP_FILE | ARCHIVE_INFLATE |
| COMPRESSION_FILE | ARCHIVE_INFLATE |
| LZMA_FILE | ARCHIVE_INFLATE |
| XZ_FILE | ARCHIVE_INFLATE |
| AR_FILE | ARCHIVE_INFLATE |
| TAR_FILE | ARCHIVE_INFLATE |
| ZIP_FILE | ARCHIVE_INFLATE |
| CPIO_FILE | ARCHIVE_INFLATE |
| ISO9660_FILE | ARCHIVE_INFLATE |


Objects
[gzip] 42a1e05-40288
[pe] 19b0dd9-80946
19b0dd94019a2ca4a978b61b8dfb7548fe0063394c932f06b73b0784a97e409f
Size: 80946
Data Type: PE Executable
Sourcefire Flags: 0x00000002
Download
Status: Bad
Sub Blocks: 0
Enterprise Flags: 0x00000000
Delete
Alerts
Priority
Inspector
Message
Metadata
1
ClamAV Scanner
ClamAV Found: Trojan.Agent-145905
1
Name
Metadata
Name of detected malware
ClamAV:Trojan.Agent-145905
1
Yara Integrated Detection Nugget
Yara signature detected: Armadillo
0
Events
Created
Nugget
Metadata
08/31/2011 14:45:59
Archive Inflate Sample
1
Known Filenames
Name
Metadata
File Name
data
Malware Names
Name
Metadata
Name of detected malware
ClamAV:Trojan.Agent-145905
Detection Engines
App type
Nugget name
Status
Yara Integrated Detection Nugget
Yara Sample
Done

e51ba80f267e8fc9bb634ce1561c022e0c9efaa42d3cf3515d6fa1bad18df754

Size: 92
Data Type: Adobe Flash
Sourcefire Flags: 0x00000002
Download

Status: Bad
Sub Blocks: 0
Enterprise Flags: 0x00000000
Delete

**Alerts**

| Priority | Inspector | Message | Metadata |
|---|---|---|---|
| 1 | Flash Inspector | Macromedia Flash ActionDefineFunction Memory Access Vulnerability | 2 |

| Name | Metadata |
|---|---|
| CVE | CVE-2005-2628 |
| Bugtraq ID | BID-15334 |

**Events**

| Created | Nugget | Metadata |
|---|---|---|
| 09/01/2011 15:54:53 | File Inject Sample | 1 |

**Known Filenames**

| Name | Metadata |
|---|---|
| File Name | /tmp/CVE-2005-2628.swf |

**Detection Engines**

| App type | Nugget name | Status |
|---|---|---|
| Yara Integrated Detection Nugget | Yara Sample | Done |
| ClamAV Scanner | ClamAV Sample | Done |
| Flash Inspector | SWF Scanner Sample | Done |

# Contact

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