# Extending Your Mainframe for More Business Value

Extend Data Security on the Mainframe

# Security and Compliance Issues

- Most Critical Security Issues for the Next Two Years:
  - Data protection
  - Identity theft and leakage of private information
  - Policy and regulatory compliance

Source: CSI/FBI Survey 2006

Deloitte 2007 Global Security Survey-- shows that 81% of respondents feel that the issue of security has risen to the level of the C-suite or board as an issue of critical concern.

# Protect Customer Data

**Our customers are very concerned about the privacy of their data**

**Service Oriented Finance CEO**

**No problem! You already have many of the required capabilities installed. We can also help you extend your security capabilities.**

**IBM**

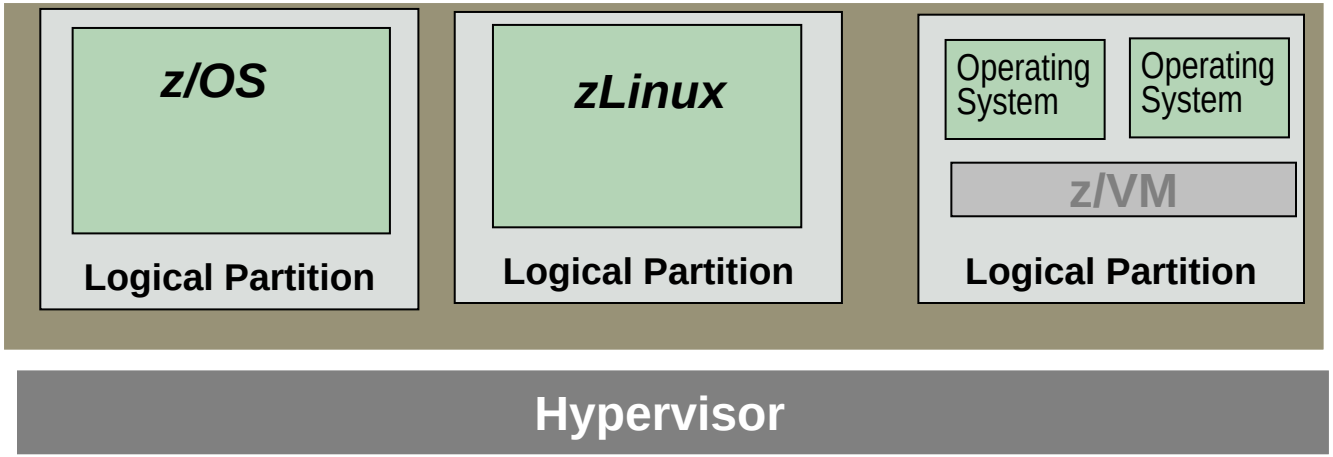
# Mainframe Extension Solution – Data Security

- **Start with a secure foundation**
  - System z platform with RACF
- **Protect customer data end-to-end**
  - Protect data on platform, off platform, and in transit
- **Block unauthorized network access**
  - Prevent intrusions
- **Establish and monitor security compliance policies**
  - Detect any breach of policy

# A Secure Foundation Is a Prerequisite to Address Security Issues

- **Workload Isolation**
  - System z Hypervisor maintains strict isolation between workloads
  - Hardware coded storage protect keys protects system and user workloads
  - Architecture design makes typical buffer overflows and virus payloads inoperable
  - HiperSockets provides secure internal communications
- **Integrated access control throughout the stack**
  - RACF enforces access control and logs security events
- **Secure cryptographic encoding**
  - On-chip crypto hardware assist and optional high speed cryptographic processors
    - Key management facility
  - **System z10 delivers stronger encryption algorithms with Advanced Encryption Standard (AES) 192 and 256**

# A Secure Foundation Requires The Highest Common Criteria Rating for Security




| Partition Manager | Linux | Other OS | VM | DB2 |
|---|---|---|---|---|
| EAL5+ | EAL4 for SuSE and Red Hat | z/OS EAL4 | zVM EAL3 | DB2 for z/OS EAL3 |

## Highest Ratings

- Common Criteria is an accepted standard for evaluating the security of a computing system
- IBM System z holds the **highest** commercial operating system Evaluation Assurance Level LPAR ratings at EAL 5+
- System z prevents unauthorized information flow between logical partitions so that confidential data remains protected

# System z Integrated Access Control

- **RACF* provides the basis of security**
  - Access, Authorization, Auditing and Administration
  - Authenticates users through passwords or certificates
  - Unified access control for System z resources
- **Security enforced automatically by internal "router"**
  - You cannot bypass mainframe security mechanisms
- **A centralized security mechanism is more secure**
  - RACF security extends across the sysplex
  - Automatic switch to a backup RACF database when an error is detected on the primary

Resources Protected by RACF

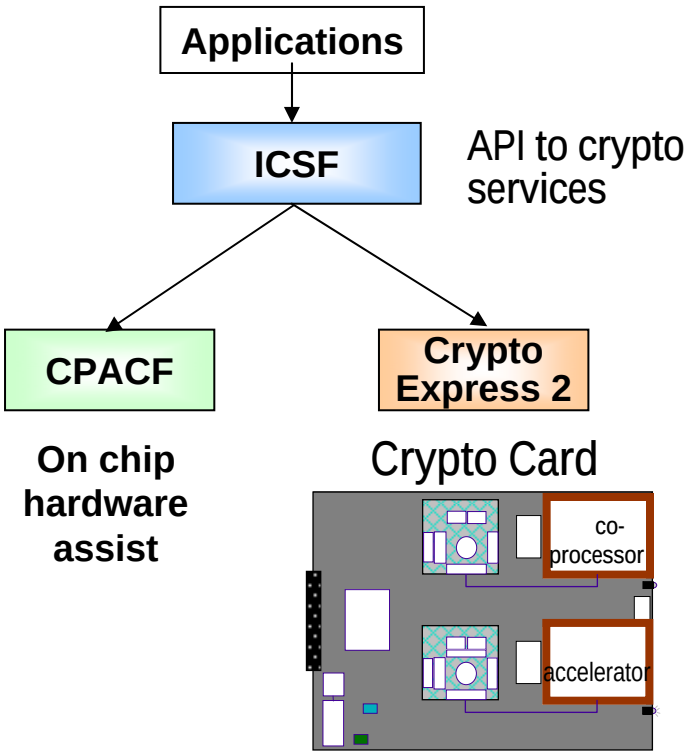

Manage all your resources consistently as you build out new applications

*** Resource Access Control Facility**

# Protect Customer Data End-to-End

- **Access to data is protected by RACF**
  - RACF gives you the ability to:
    - Identify and authenticate Users
    - Log and report unauthorized access attempts
    - Provides role-based access control
- **Data can be encrypted throughout its lifecycle**
  - On platform
    - On System z with or without the use of crypto cards
  - Off platform
    - Via tape encryption or network encryption

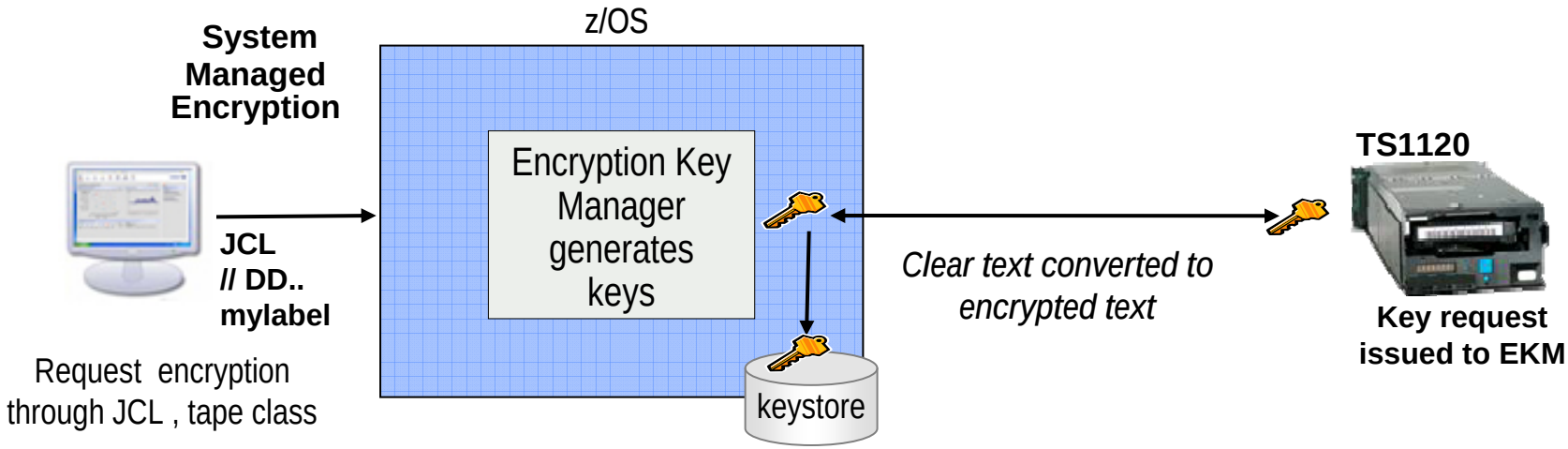
# Built In Encryption on System z Protects Data Privacy




- **Central Processor Assist for Cryptographic Function (CPACF)**
  - A CP Assist for Cryptographic Function (CPACF) is provided free of charge on every chip
  - Provides clear key encryption
- **Crypto Express2 Card**
  - High performance cryptography for SSL
    - 6,000 handshakes per second
  - Secure key cryptography
  - Dynamically configurable
    - Co-processor or Accelerator
  - FIPS 140-2 Level 4 compliant
  - Clears out memory if tampered with
- **Trusted Key Entry** (TKE) Workstation
  - Secured workstation for remote key entry

# Prevent Exposure if the Tape Falls Off the Truck!

- **High performance tape encryption**
  - Protects data on lost tapes
  - Standard feature on all new TS1120 Tape Drives
  - Cost effectively encrypts all tape data
  - Offloads host encryption overhead
- **Leverages System z Key protection**
  - Create a key and store it securely - same key value can be available 20 years from now!
  - Policy for encryption specified on DFSMS Data Class
  - User never sees the key!



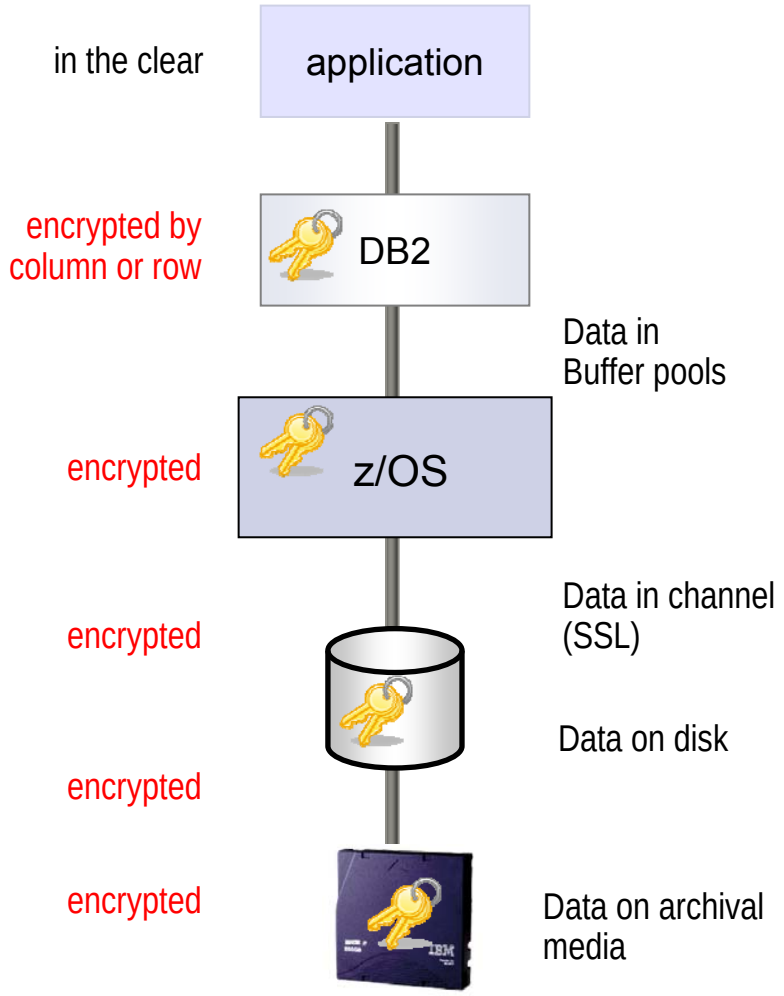
# System z Encryption Key Management

## Encryption Key Manager (EKM)

- Java program that transparently generates, serves and maintains encryption keys
- **Provides a single point of control**
  - Simplified recovery of keys
  - Auditable through RACF
  - Over a decade of proven production use
  - Available at no additional charge
- **Helps protect and manage keys**
  - Generate and serves keys to tape drives
  - Uses tamper-resistant crypto cards to store “secure keys”
  - Can retrieve required keys from protected key stores
- **Options to store the keys**:
  - RACF protected key stores
  - Secure hardware
  - Other protected data sets, files

# Protect Data Privacy Using DB2

- DB2 uses either clear key (CPACF) or secure key (Crypto Express2 card) for encryption
- DB2 supports encryption at every level:
  - In memory, buffers, disk, and archival media
  - Table, Index, logs, and backup copies
  - Data sent by remote access (DRDA)
- DB2 provides multiple options for table encryption:
  - Column level encryption
    - Enabled by the application
  - Row level encryption
    - IBM Encryption Tool for DB2



# Multi-Level Security (MLS) Supports Users with Different Security Clearances

## Goals of Multi-Level Security

- Share one data base among organizations with different "need to know"
- Prevent individuals from accessing information at a higher classification level than what is permitted

## DB2 Multi-Level Security

- Restricts row level access to those with appropriate clearance
- Combines both low and high security data in the same database- eliminating redundant infrastructures

Underwriter

Claims Analyst

National Broker

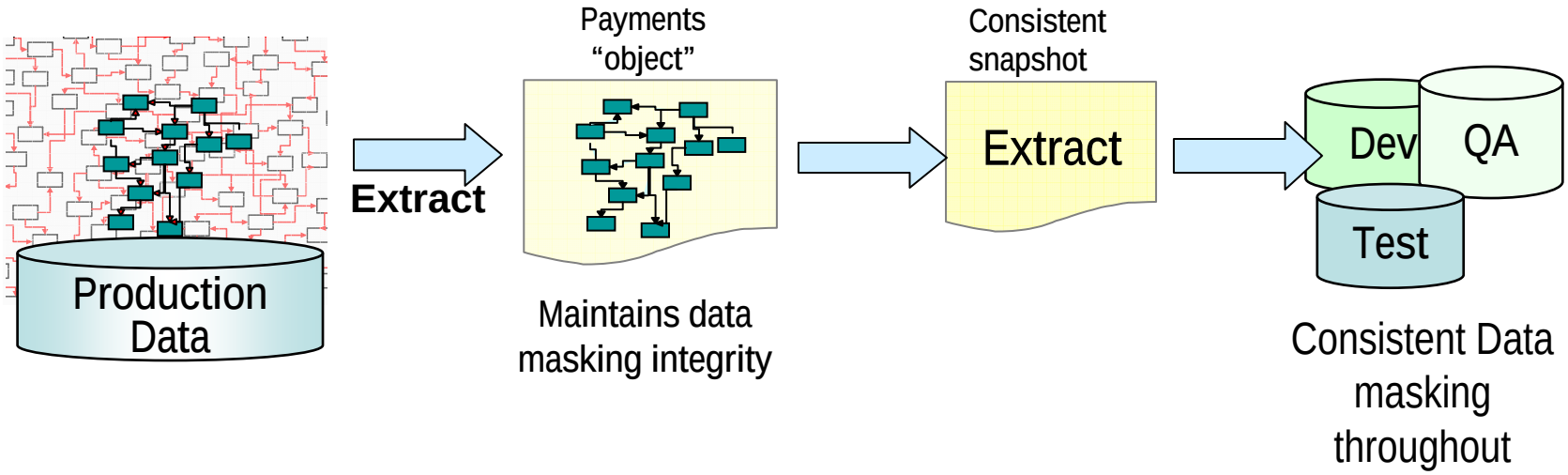
| SECURITY Classification | Revenue | Area | Loss |
|---|---|---|---|
| Business Broker | 234 | USA | 50% |
| Underwriter | 198 | Ohio | 23% |
| Claims analyst | 2 | Maine | 9% |
| Underwriter | 234 | USA | 11% |
| Claims analyst | 87 | Texas | 14% |
| Affiliate broker | 23 | NewYork | 20% |
| National broker | 223 | USA | 10% |
| Affiliate broker | 45 | Canada | 29% |

# Abraxas Informatik Uses RACF for Secure Outsourcing Services

- Abraxas Informatik AG is one of the largest governmental outsourcers in Switzerland
- Challenges Abraxas faced:
  - High levels of security were needed to handle confidential government information
  - Both CA ACF2 and Top Secret were installed, requiring staff knowledgeable in both
  - Abraxas needed to simplify their security structure, and reduce security expenses
- Solution:
  - Replaced ACF2 and TopSecret with RACF
  - RACF allowed Abraxas to quickly manage resource access and user accountability
- Results:
  - Abraxas now saves 200,000 Swiss francs or $US 180,042 annually
  - Abraxas is now better positioned to offer excellent security services while keeping its fees competitive

abraxas Informatik AG
Ihr Informatik-Partner für öffentliche Verwaltungen und Organisationen

# Don’t Forget to Protect Customer Data During Testing of New Releases



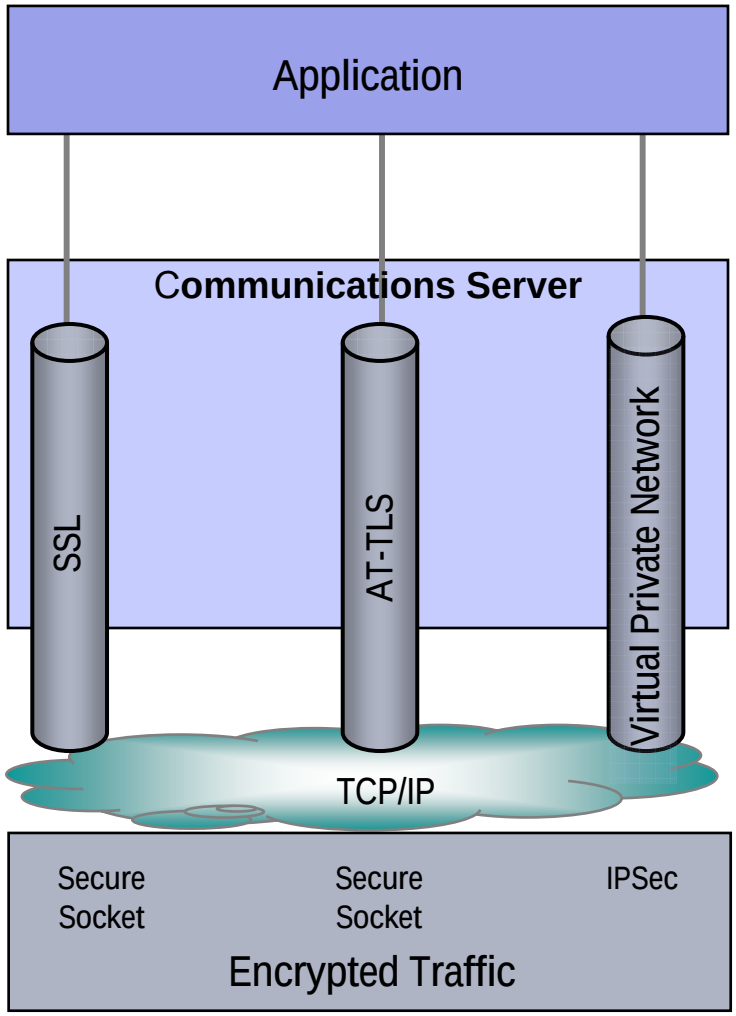

- Protect customer data throughout testing cycle with Optim
- Customer data can be compromised during testing cycles, especially during audits
- Mask or replace customer data with fictional data in a consistent manner preserving the integrity of data relationships
- Extract a snapshot for testing purposes

Supports many data formats:

DB2, Informix, IMS, VSAM, Oracle, others

# Block Unauthorized Network Access

- z/OS Communication Server is the first line of defense against network attacks
  - Defensive IP filtering (built-in firewall)
- z/OS Communications Server provides multiple styles of encryption for network traffic
  - Application layer encryption
  - Network layer encryption
  - Support for Virtual Private Networks with IPSec
- Application Transparent Transport Level Security (AT-TLS) transparently encrypts application data
- SSL and IPSec processed by crypto processor if available
  - IPSec can be offloaded to zIIP

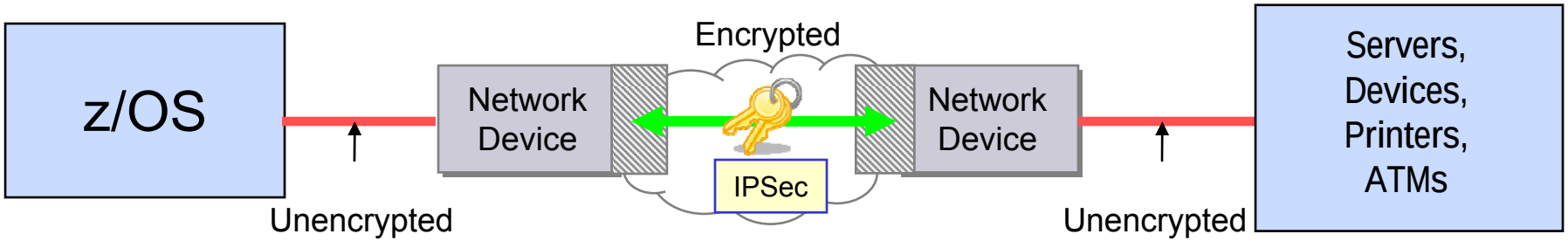



*AT-TLS= application transparent transport level security

# System z Communication Server Encrypts Network Data End-to-End

- Critical for companies that outsource their network yet want greater control over confidential data
- Other router based encryption alternatives expose data in the clear and lack the intrusion detection capabilities of the mainframe.


**System z - End-to-end encryption**

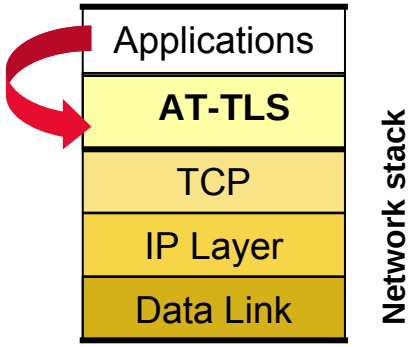



**Encryption with routers can leave gaps**

# Make Encryption Accessible to Legacy Applications

- Allow applications to readily invoke SSL for encrypted traffic
- Application Transparent- Transport Layer Security (AT-TLS) provides a cost effective method of enabling encryption
- Applications can directly access Transport Layer Security without requiring any code modifications
  - Add new functions and new cipher suites readily
  - Remove burden of modifying legacy applications
  - Support most mainframe application languages
    - C/C++, COBOL, CICS sockets, Assembler

Applications invoke encryption through AT-TLS



# RACF Security Event Logging

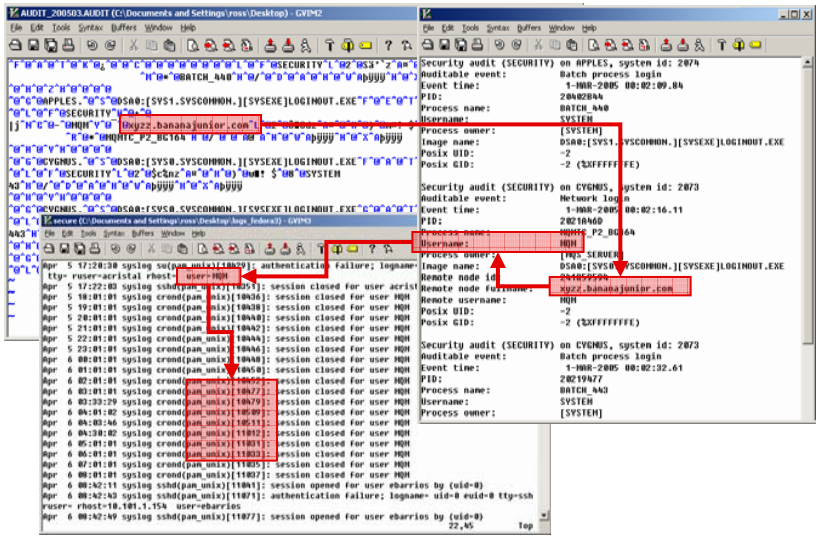
- RACF helps you to audit access control and accountability:
  - Started during IPL to prevent vulnerabilities from being introduced
  - Audit control functions specify the information RACF should log
  - SMF log datasets themselves are protected
  - RACF SMF data unload utility converts SMF records into formats used by other tools

- RACF logs many events:
  - All accesses to specific data sets, general resources
  - All accesses to a specified class of resources at a specified access level
  - All attempts to access a resource with a security level of confidential
  - RACF-related activities of specific users
  - Unauthorized attempts to use RACF commands
  - All RACF commands issued by users who have SPECIAL authority
  - Changes to any RACF profiles

# Common Logging Simplifies Security Compliance Monitoring

- The mainframe offers comprehensive auditing capabilities for all its subsystems
  - Unified access control with RACF
  - Common logging of RACF security events
- System z's common logging avoids integration and compliance challenges posed by multiple inconsistent and incompatible log formats

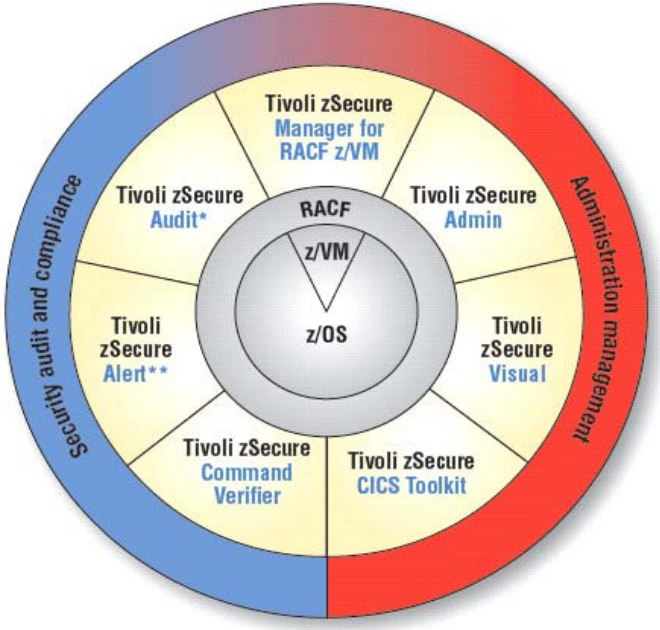
*With other systems, customers have to manually make sense out of all these different log formats*



# Tivoli zSecure Suite Extends System z Security management

- Tivoli zSecure Alert
  - Can issue alerts when conditions occur
  - Provides real-time threat monitoring for z/OS and RACF
  - Can take action to stop security breaches
  - New RACF offline option simulates impact of RACF changes
- Tivoli zSecure Audit
  - Provides real-time exception alerts
  - An audit and reporting tool for the mainframe
  - Built-in knowledge base identifies exposures
  - Can check integrity of sequential log data residing on tape or disk
- Tivoli zSecure Command Verifier
  - Prevent erroneous RACF commands from executing

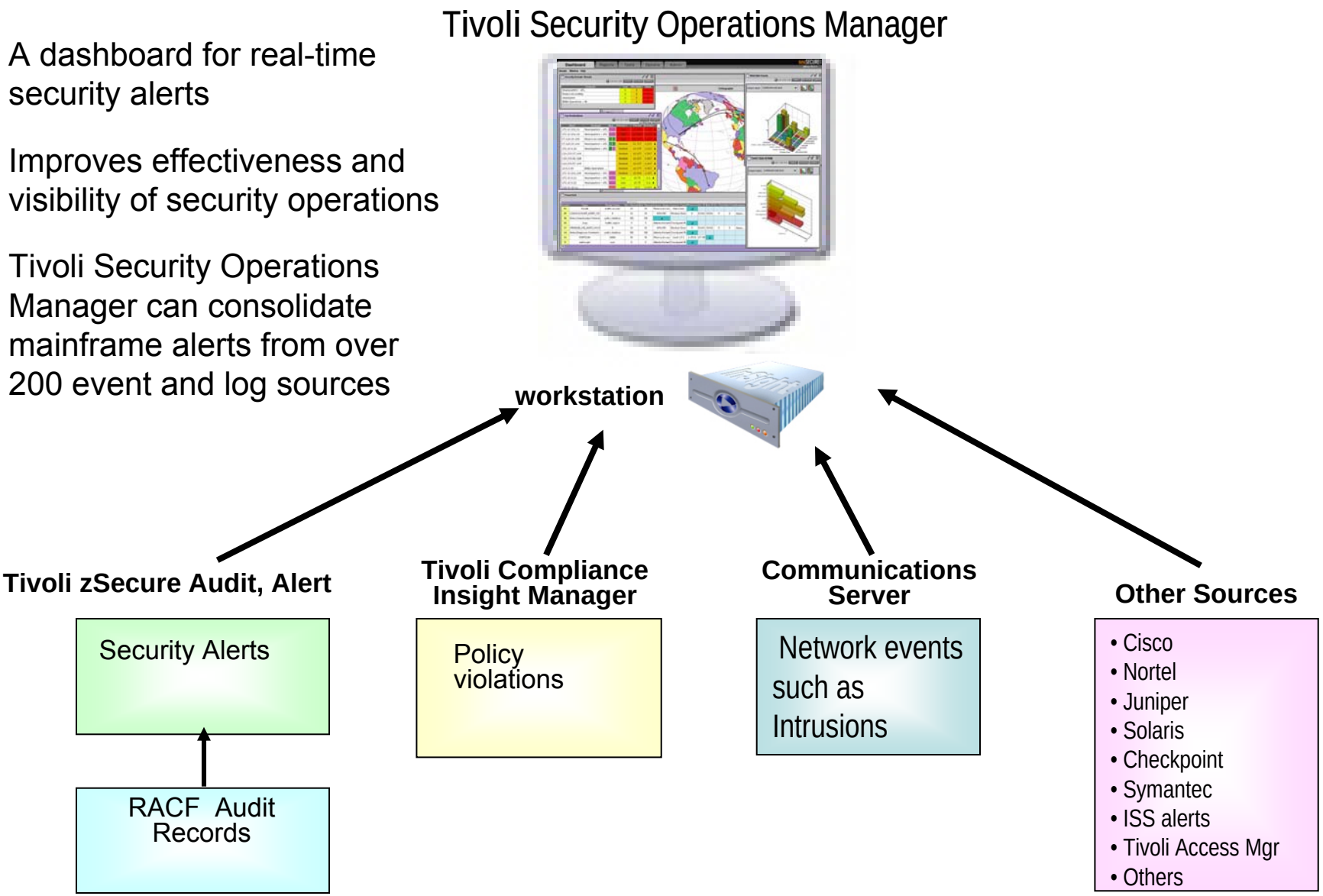
**Tivoli zSecure Suite**




*Also available for ACF2™ and Top Secret®
**Also available for ACF2

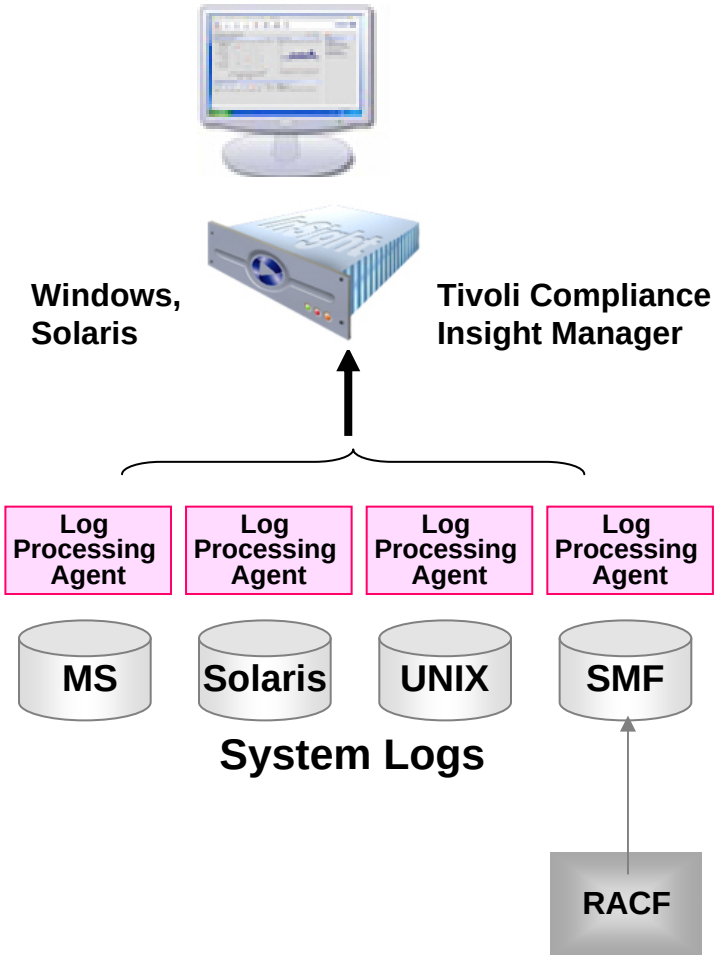
# Tivoli Security Operations Manager (TSOM)

- A dashboard for real-time security alerts
- Improves effectiveness and visibility of security operations
- Tivoli Security Operations Manager can consolidate mainframe alerts from over 200 event and log sources



# Tivoli Compliance Insight Manager Provides System Wide Security Management

- Captures log data on security events from multiple systems
- Correlates data to identify audit risks
  - Unique “W7” format: ***w***ho, ***w***hat, on ***w***hat, ***w***here, ***w***hen, from ***w***here, to ***w***here
  - Makes log data easy to understand
- Analysis engine provides a deeper, intelligent analysis of collected data
  - Trace last person to touch a particular resource
  - Link access to resources by users



# DEMO: Tivoli Compliance Insight Manager

- Broad file access permission is often granted to privileged users
- But through fraud or accident, privileges may be abused
- Suspicious activity and policy violations are detected by TCIM
- These activities may uncover weak security controls
- Regulatory impact too; Sarbanes-Oxley requires strong security controls

Michael, Sales Manager, wants permission to read Finance files

Let's see what he does…

Grants access rights (defined by RACF)

Eric (Security Support) grants Michael read access to files on Finance Server

Reads customer files …plus more!

Michael accesses files on the Finance Server—including payroll files!

Discovers the security violation

Paul (Auditor) recognizes a violation of policy pointing to a security control weakness

Suggests strengthening security rules

# Mainframe Extension Solution – Data Security
# Make the Most of What You Already Have!

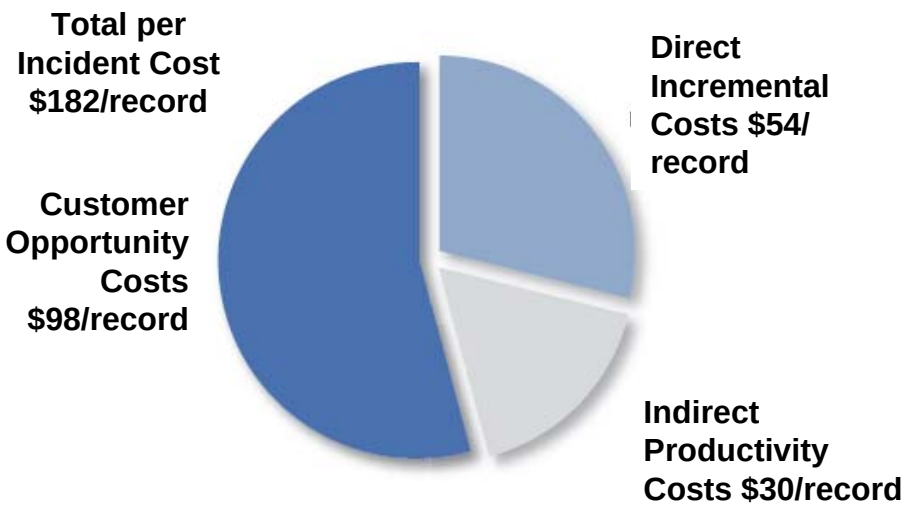
| | | |
|---|---|---|
| **System z** | System z trusted base | Workload isolation and storage protection, common criteria evaluation |
| | z/OS | Avoid need for extra virus control mechanisms or firewalls with System z architecture |
| | SMF, RACF | Built in logging with SMF records in a consistent format, turn on logging, use RACF to log events |
| **Data Security** | RACF | MLS capabilities of RACF, DB2 provide granular security to support different classification schemes |
| | CPACF | Entitled clear key cryptography |
| | EKM | Provides the ability to issue, maintain and retrieve cryptographic keys |
| **Communications** | z/OS Communications Server | Provides intrusion defense , policy management as well as secured communications |
| | AT –TLS | Communications Server of System z provides easily accessible encrypted communications for applications |

Further extend security

| | | |
|---|---|---|
| **Encryption** | TS 1120 tape drive and C06 CU | Secured tape drive with encryption capabilities built in |
| | 2 Crypto Express2 Cards | Buy crypto cards for acceleration and co-processing |
| | zIIPs (Comm Server + zIIP) | Leverage zIIPs for IPSec |
| **Compliance And Testing** | zSecure | Simplifies administration and provides auditing analysis tools |
| | TSOM | Tivoli Security Operations Manager provides advanced network and systems security event management |
| | TCIM | Tivoli Compliance Insight Manager provides auditing and compliance reporting |
| | Optim | Optim provides testing while protecting data confidentiality |

# The Cost of a Data Security Breach

- **Total per-incident costs** including average direct, indirect, and opportunity costs:
  - $182 per record, or $4.8 million per company
- Range of surveyed breach costs:
  - $226,000 to $22 million per incident
- Each incident resulted in an average 2 percent loss of existing customers
  - Worst case was 7 percent




**Ponemon Study: 2006 Survey Cost of a Data Breach**

# Case Study: Mainframe Extension Solution – Deploy New Security Capabilities

*Existing Mainframe*

Existing z10:
6 GP 4,000 MIPS
1 zIIP
Tape CU
DB2 workload
z/OS, RACF
Communications Server

*Add mainframe compliance & management products*

Prod

Incremental:
1 zIIP for IPSec
2 TS1120 tape drives
2 Crypto Express2 cards
2 Intel servers
zSecure
TSOM/ TCIM bundle
Optim

*3 year cost of acquisition $3.83M*

*According to the* Ponemon Study: 2006 Survey Cost of a Data Breach*, the average incident costs $4.8M*

# Mainframe Extension Solution – Data Security Incremental Cost Breakdown

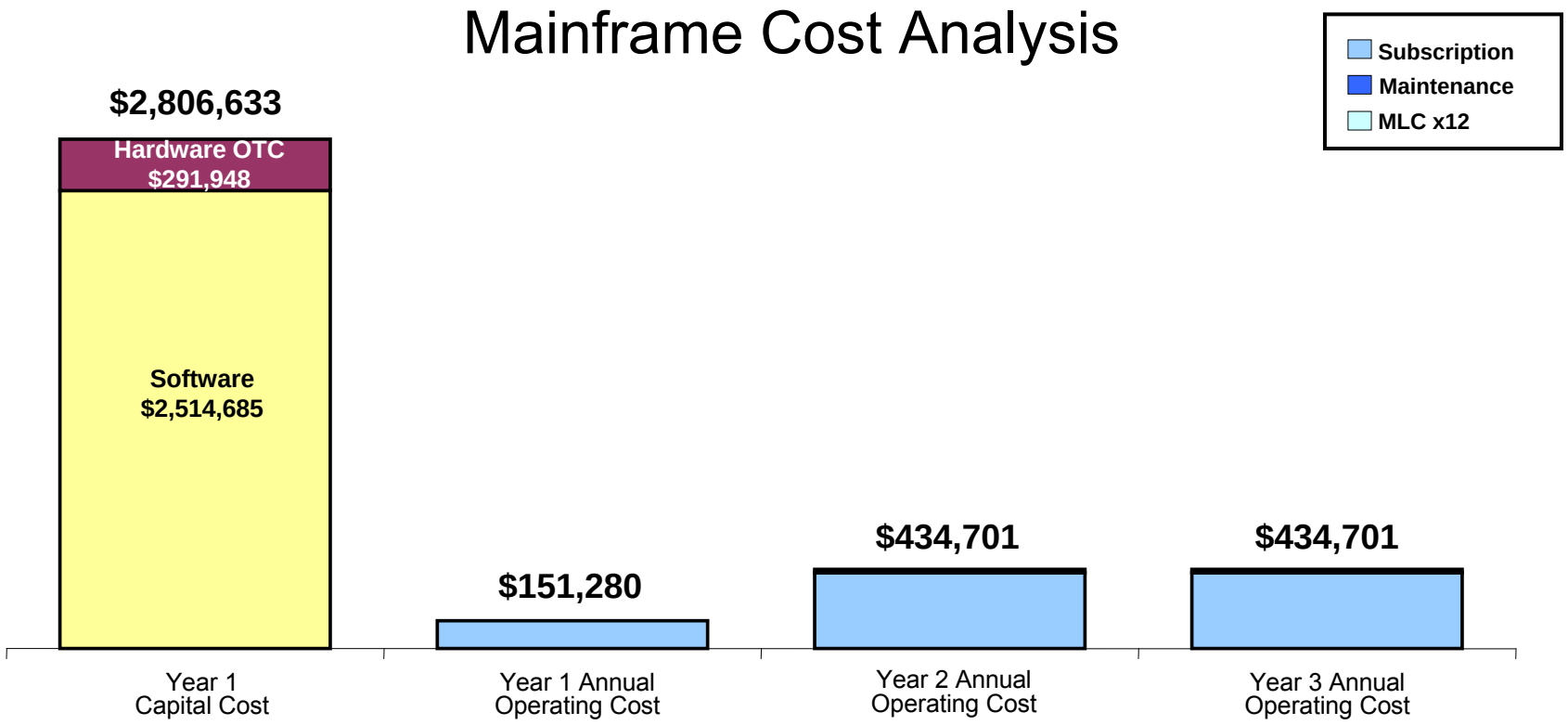
## Mainframe Incremental Hardware

| OTC | | ANNUAL | |
|---|---|---|---|
| IBM 3500 x-Series TSOM | $11,464 | zIIP Processor Maintenance (For year 2, 3) | $17,508 |
| IBM 3500 x-Series TCIM | $7,984 | | |
| 1 zIIP Processor | $125,000 | | |
| 2 Crypto Cards | $76,000 | | |
| 2 TS1120 | $71,000 | | |
| CU | $500 | | |
| TOTAL | $291,948 | TOTAL | $17,508 (year 2, 3) |

## Mainframe Incremental Software

| OTC | | ANNUAL | |
|---|---|---|---|
| zSecure Alert | $251,100 | zSecure Alert S&S | $50,220 |
| zSecure Audit | $229,400 | zSecure Audit S&S | $45,880 |
| zSecure Admin | $136,400 | zSecure Admin S&S | $27,280 |
| zSecure Command Verifier | $139,500 | zSecure Command Verifier S&S | $27,900 |
| Optim | $1,685,587 | Optim S&S (For year 2,3) | $251,913 |
| Linux for IBM x-Series | $1,499 | | |
| Windows on IBM x-Series | $1,199 | TSOM & TCIM S&S (For year 2,3) | $14,000 |
| TSOM & TCIM | $70,000 | | |
| TOTAL | $2,514,685 | TOTAL | $151,280 (year 1) $417,193 (year 2,3) |

# Mainframe Extension Solution – Data Security Cash Flow




Total cost = $3,827,315

**Our customers are much happier with our extended security.**

**Service Oriented Finance**
**CEO**