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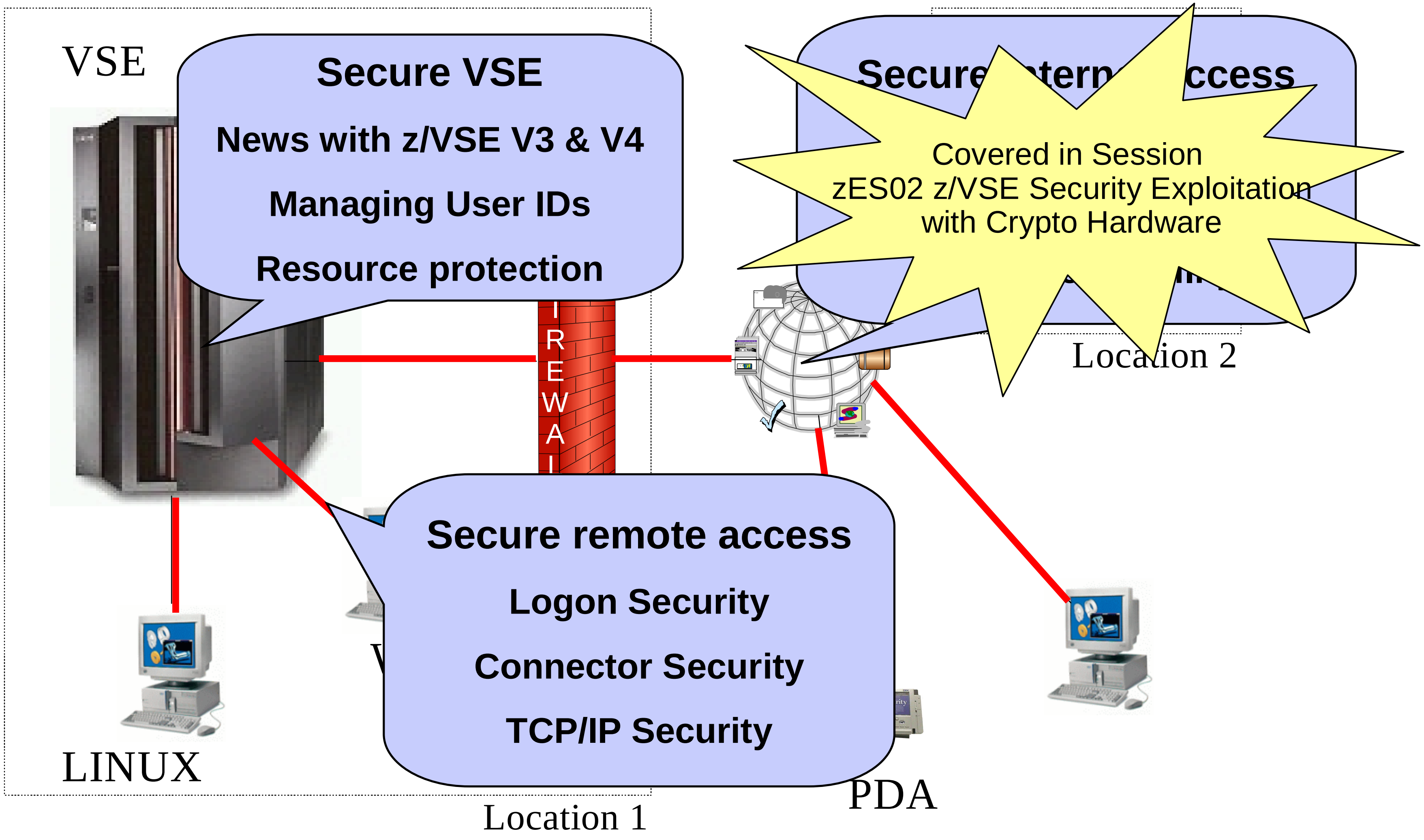
Security requirements

- Security requirements are increasing in today's world
  - Data security
  - Data integrity
  - Keep long-term data audit-save
- The number of attacks increase daily
  - Industrial spying
  - Security exploits, Denial-of-Service attacks
  - Spam, Phishing, …
- Not paying attention to security requirements can be very expensive
  - Your data is the heart of your company
  - Loosing your customer data is a disaster
  - You can loose customers
- IT Security gets more and more important
  - You need to consider the whole IT Environment not only single systems

Security in a heterogeneous environment



Secure VSE

News with z/VSE V3 & V4

Managing User IDs

Resource protection

Covered in Session
zES02 z/VSE Security Exploitation
with Crypto Hardware

Secure remote access

Logon Security

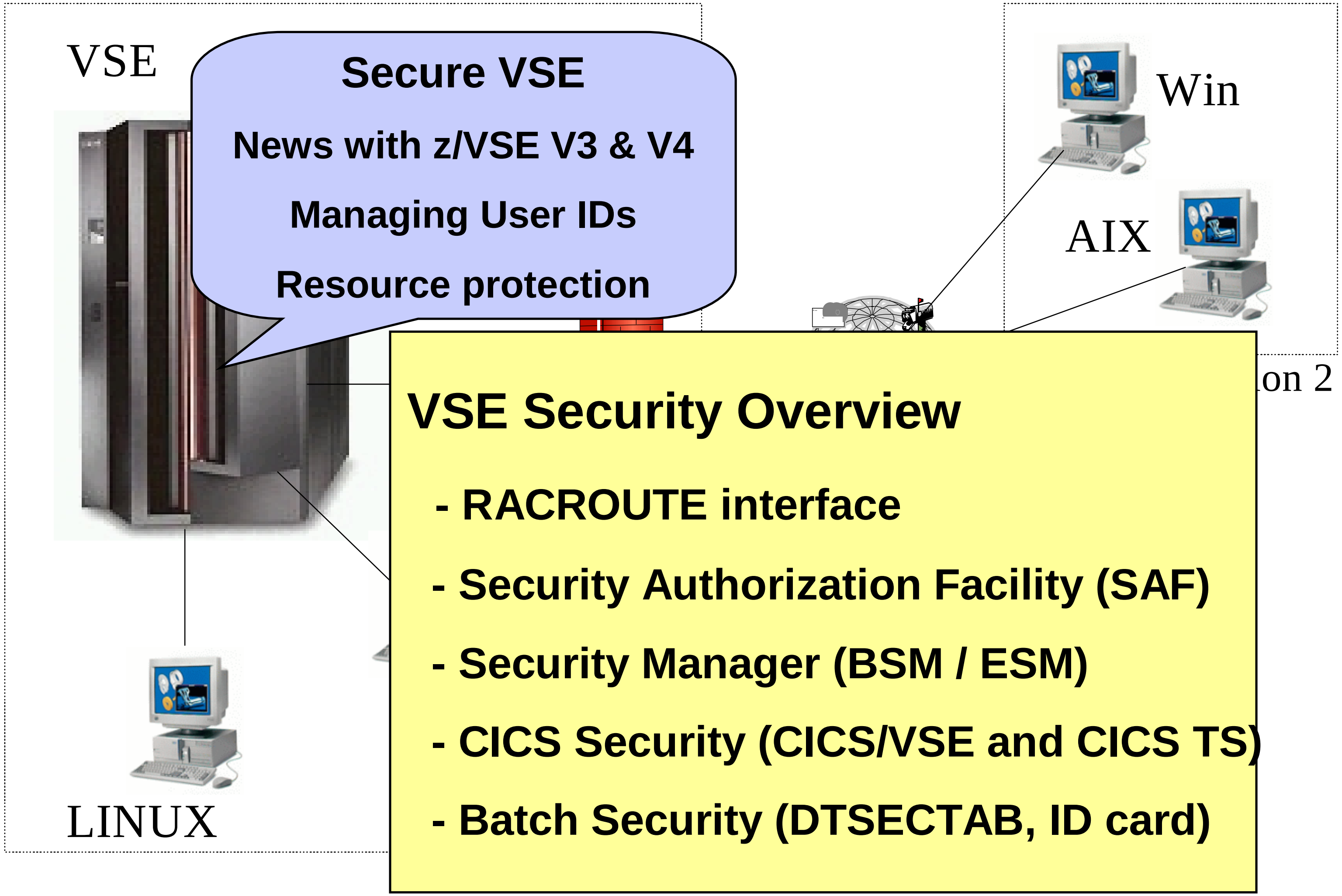
Connector Security

TCP/IP Security

Security in a heterogeneous environment

- Security is very important
  - Restrict access to systems
  - Keep secrets
  - Prove identity of users
  - Prevent data modification
- Security can be very complex
  - In an heterogeneous environment
  - A lot of different servers and technologies
- You must know what you are doing !
  - Incomplete security setup can be more dangerous than NO security

Security in a heterogeneous environment



Secure VSE

News with z/VSE V3 & V4

Managing User IDs

Resource protection

VSE Security Overview

- **RACROUTE interface**
- **Security Authorization Facility (SAF)**
- **Security Manager (BSM / ESM)**
- **CICS Security (CICS/VSE and CICS TS)**
- **Batch Security (DTSECTAB, ID card)**

Why secure VSE ?

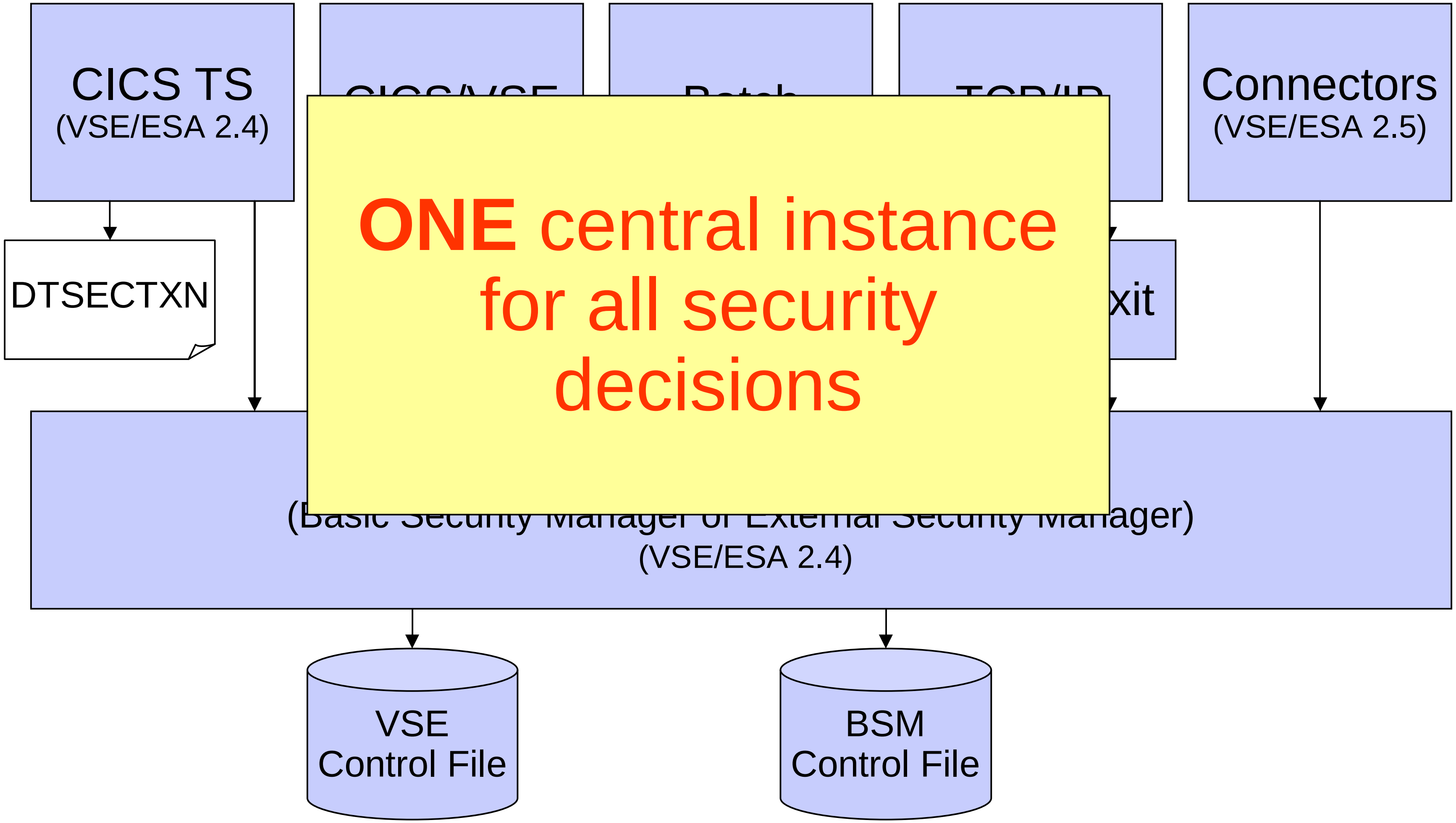
- Prevent unauthorized access to VSE and data
  - Keep secret data secret
  - Data modification by unauthorized users

- Prevent users from damaging the VSE system (maybe by accident)
  - Deletion of members or entries
  - Submission of jobs

VSE Security Overview

- VSE/ESA 2.3 (or below)
  - SECHECK macro (DTSECTAB)
  - CICS/VSE internal security
- VSE/ESA 2.4-2.7, z/VSE 3.1
  - Security Server (BSM/ESM)
  - Security decisions delegated to Security Manager
  - Architecture defined interface (RACROUTE)
- New with z/VSE 3.1.1: BSM enhancements
  - User Groups
  - Description field for all profiles
  - BSM Resource Profiles
  - New resource classes
- New with z/VSE 4.1: Audit-logging and reporting
- New with z/VSE 4.2: LDAP Signon support

VSE Security Components



CICS TS
(VSE/ESA 2.4)

CICS/VSE

Batch

TCP/IP

Connectors
(VSE/ESA 2.5)

DTSECTXN

xit

(Basic Security Manager or External Security Manager)
(VSE/ESA 2.4)

VSE
Control File

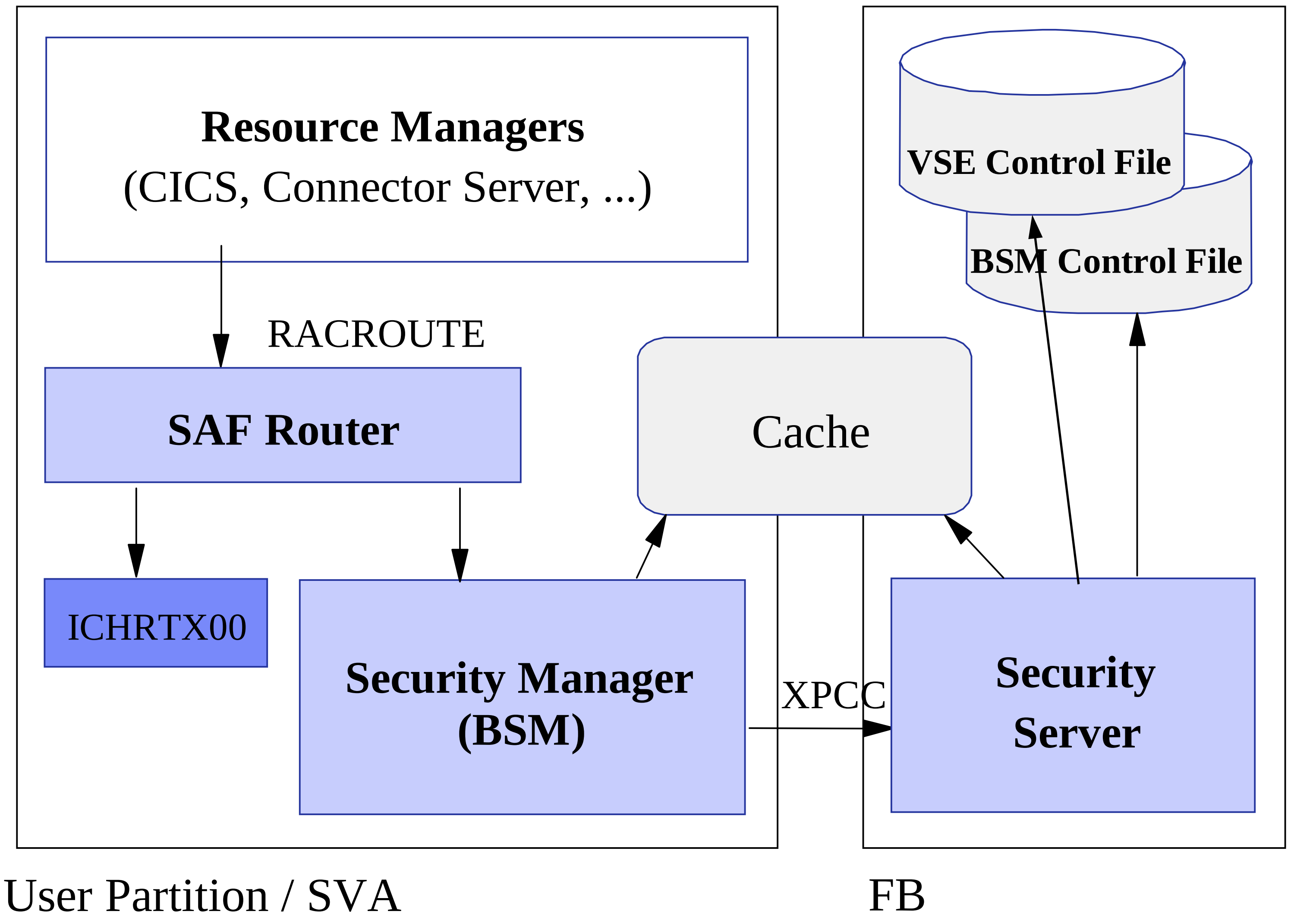
BSM
Control File

ONE central instance for all security decisions

Security Managers

- Basic Security Manager (BSM)
  - Part of VSE Central Functions
  - Sign on Security
  - Transaction Security
  - Resource Security
- External Security Manager (ESM)
  - CA-Top Secret
  - BIM Alert
  - Vendor

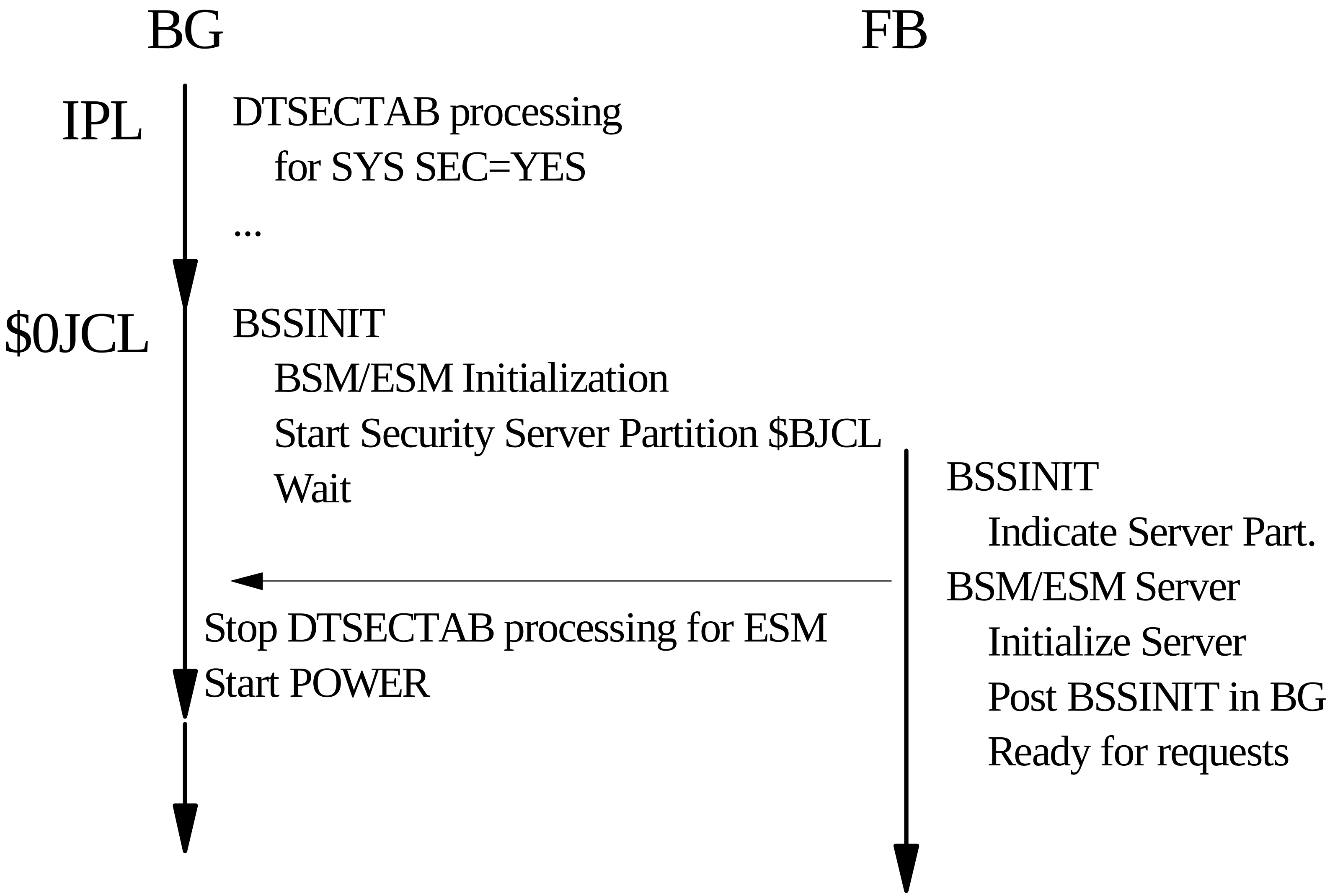
Security Authorization Facility (SAF) and Basic Security Manager



RACROUTE interface

- Architecture defined interface
- External interface to the Security Authorization Facility (SAF)
- To be used by Resource Managers and Subsystems
  - CICS TS
  - VSE Connector Server
  - DITTO/ESA for VSE
  - TCP/IP Security Exit
  - Interactive Interface Sign on

Common Security Startup



BG

FB

IPL

DTSECTAB processing

for SYS SEC=YES

…

$0JCL

BSSINIT

BSM/ESM Initialization

Start Security Server Partition $BJCL

Wait

BSSINIT

Indicate Server Part.

BSM/ESM Server

Initialize Server

Post BSSINIT in BG

Ready for requests

Stop DTSECTAB processing for ESM

Start POWER

Common Security Startup (continued)

- Security manager (BSSINIT) has to initialize before other partition or POWER are active
- BSSINIT will fail, if there are other partition active
- Static partition required for Security Server
- SYS ESM=phasename in IPL proc to start ESM
- If no ESM is started, BSM is activated
- For SYS SEC=YES with ESM a DTSECTAB protection is active until ESM is initialized

Basic Security Manager - Recovery

- If an active Security Manager does not allow to recover from a problem
  - IPL cuu LOADPARM ..P
  - STOP=DPD
  - 0 SYS SEC=RECOVER
  - BSSINIT will not start a Security Manager
  - Re-IPL required to start Security Manager again

Basic Security Manager

- Provides RACROUTE support for
  - Sign on (CICS and VSE Connector Server)
  - Batch sign on (ID statement)
  - Transaction security
- Supports also the SVC-based security calls
  - SECHECK
- Resource classes
  - USER
  - DATASET
  - VSELIB, VSESLIB, VSEMEM
  - TCICSTRN
  - New with z/VSE 3.1.1: MCICSPPT, FCICSFCT, JCICSJCT, SCICSTST, DCICISDCT, ACICSPCT, APPL, FACILITY

Basic Security Manager - New with z/VSE 3.1.1

- New BSM repository
  - BSM Control File (VSAM file)
  - Maintains a copy in data space for performance reasons
  - Replaces DTSECTXN
- New resource classes (see next foil)
- Description field for all profiles (20 characters)
- User Groups
  - Replaces the security classes concept for CICS
- Password rules can be changed by command
  - Replaces IESIRCVT
- New admin functions
  - BSTADMIN (console or batch)
  - Interactive Interface Dialogs

Basic Security Manager - New with z/VSE 3.1.1

– New resource classes

TCICSTRN	- Transactions (as on VSE/ESA 2.7)
MCICSPPT	- Application programs
FCICSFCT	- Files
JCICSJCT	- Journals
SCICSTST	- Temporary storage queues
DCICISDCT	- Transient data queues
ACICSPCT	- Transactions (CICS START)
APPL	- Applications
FACILITY	- Miscellaneous resources

Basic Security Manager - New with z/VSE 4.1

- Audit-Logging and Reporting
  - All access attempts to protected resources can be logged
    - Allowed access as well as disallowed access
  - Possible attacks can be detected
    - E.g. multiple logon attempts with invalid password
  - You can comprehend who did when access which resource
  - Analysis can be done using a reporting tool
    - Summary report
    - Detailed report of all access attempts
  - Uses the CICS DMF Tool
    - Creates SMF records containing logging information

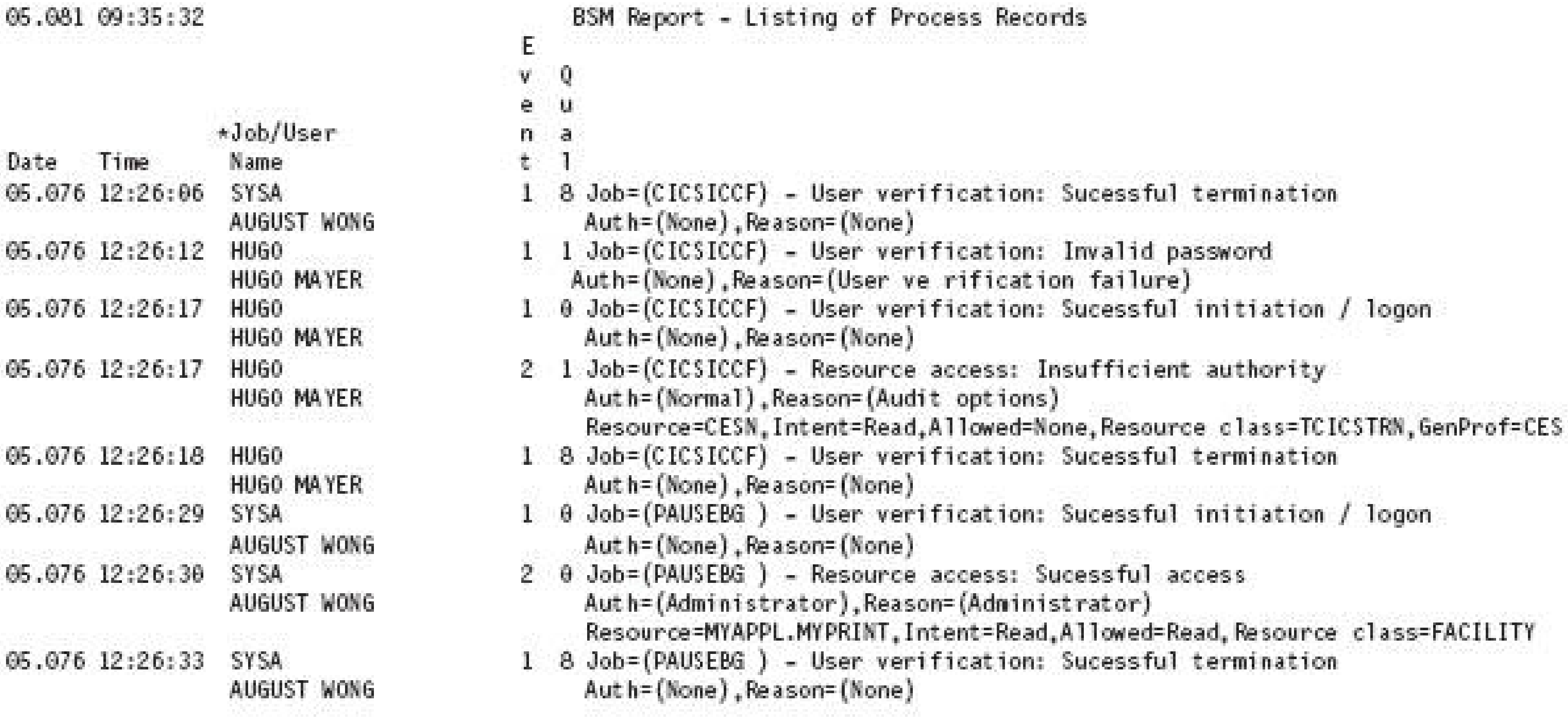
Audit-Logging and Reporting

- To activate logging for a specific resource, you need to specify the AUDIT option (BSTADMIN) on the resource profile
  - AUDIT(***audit-level***)
    - **ALL**
      - Specifies that all authorized accesses and detected unauthorized access attempts should be logged.
    - **FAILURES**
      - Specifies that all detected unauthorized access attempts should be logged (the Default).
    - **SUCCESS**
      - Specifies that all access attempts that were authorized should be logged.
    - **NONE**
      - Specifies that no logging should be done.
- **Note: You should use the auditing function with care. It will increase the BSM and DMF processing and might negatively affect the performance of your z/VSE system!**

Audit-Logging and Reporting

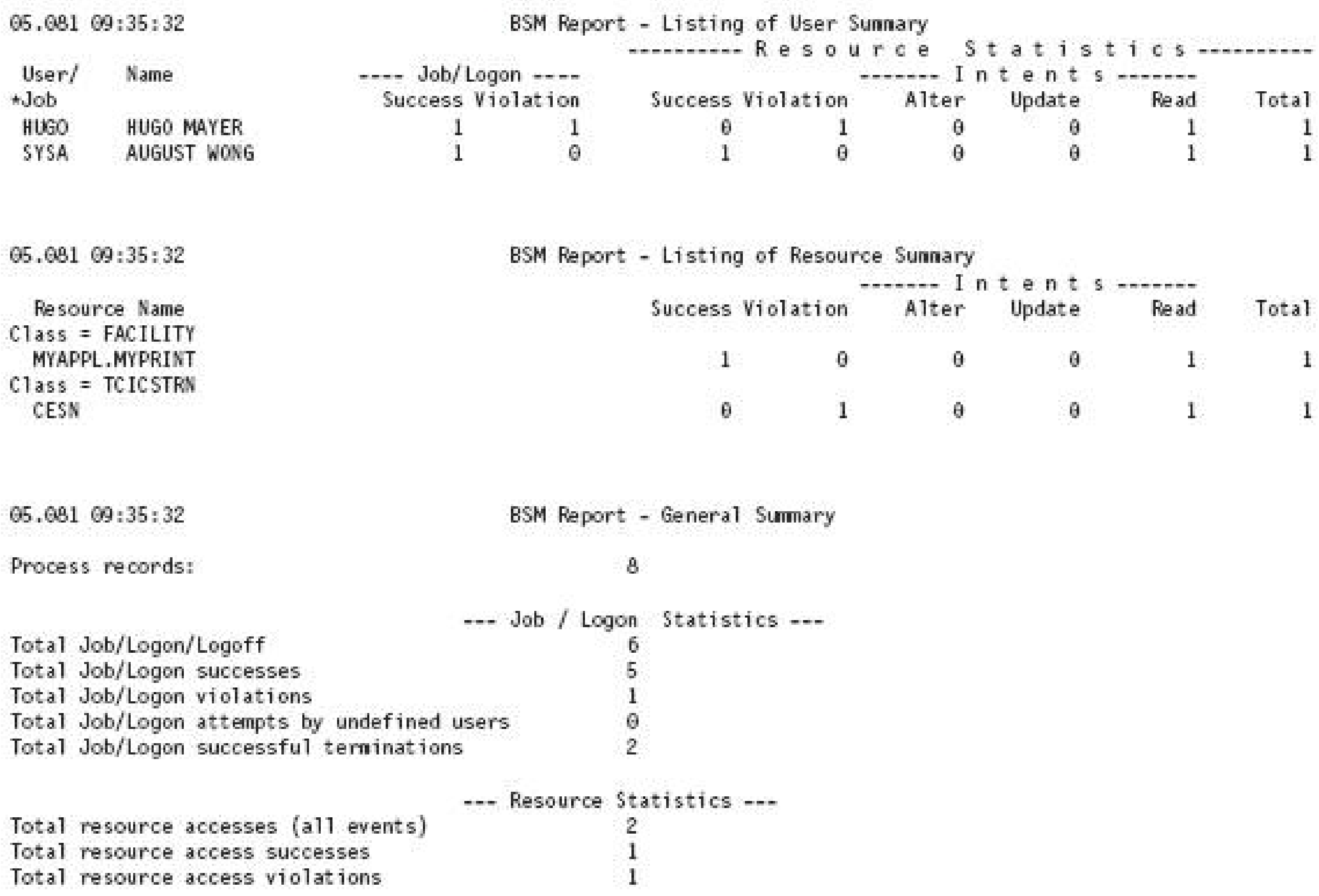
- **Audit-Logging uses the CICS DMF facility to store the recorded SMF records**
- **Use the DMF dump utility DFHDFOU to dump the audit records (type 80) to a intermediate file**
- **Use the BSM Report Writer to create a readable report from the audit records**
- **The report contains**
  - A detailed listing of the processed records
  - A summary of the user entries
  - A summary of the resource entries
  - A general summary

Audit-Logging and Reporting



```
05.081 09:35:32                                 BSM Report - Listing of Process Records
                                              E
                                              v  Q
                                              e  u
                         *Job/User            n  a
Date     Time             Name                t  l
05.076 12:26:06  SYSA                         1  8 Job=(CICSICCF) - User verification: Sucessful termination
                 AUGUST WONG                       Auth=(None),Reason=(None)
05.076 12:26:12  HUGO                         1  1 Job=(CICSICCF) - User verification: Invalid password
                 HUGO MAYER                       Auth=(None),Reason=(User ve rification failure)
05.076 12:26:17  HUGO                         1  0 Job=(CICSICCF) - User verification: Sucessful initiation / logon
                 HUGO MAYER                        Auth=(None),Reason=(None)
05.076 12:26:17  HUGO                         2  1 Job=(CICSICCF) - Resource access: Insufficient authority
                 HUGO MAYER                        Auth=(Normal),Reason=(Audit options)
                                                   Resource=CESN,Intent=Read,Allowed=None,Resource class=TCICSTRN,GenProf=CES
05.076 12:26:18  HUGO                         1  8 Job=(CICSICCF) - User verification: Sucessful termination
                 HUGO MAYER                        Auth=(None),Reason=(None)
05.076 12:26:29  SYSA                         1  0 Job=(PAUSEBG ) - User verification: Sucessful initiation / logon
                 AUGUST WONG                       Auth=(None),Reason=(None)
05.076 12:26:30  SYSA                         2  0 Job=(PAUSEBG ) - Resource access: Sucessful access
                 AUGUST WONG                       Auth=(Administrator),Reason=(Administrator)
                                                   Resource=MYAPPL.MYPRINT,Intent=Read,Allowed=Read,Resource class=FACILITY
05.076 12:26:33  SYSA                         1  8 Job=(PAUSEBG ) - User verification: Sucessful termination
                 AUGUST WONG                       Auth=(None),Reason=(None)
```

Audit-Logging and Reporting



```
05.081 09:35:32                          BSM Report - Listing of User Summary
                                                    ---------- R e s o u r c e   S t a t i s t i c s ----------
 User/    Name                  ---- Job/Logon ----                     ------- I n t e n t s -------
*Job                              Success Violation     Success Violation    Alter    Update       Read      Total
 HUGO     HUGO MAYER                    1         1           0         1        0         0          1          1
 SYSA     AUGUST WONG                   1         0           1         0        0         0          1          1


05.081 09:35:32                          BSM Report - Listing of Resource Summary
                                                                        ------- I n t e n t s -------
  Resource Name                                         Success Violation    Alter    Update       Read      Total
Class = FACILITY
  MYAPPL.MYPRINT                                              1         0        0         0          1          1
Class = TCICSTRN
  CESN                                                        0         1        0         0          1          1


05.081 09:35:32                          BSM Report - General Summary

Process records:                                    8

                                      --- Job / Logon  Statistics ---
Total Job/Logon/Logoff                              6
Total Job/Logon successes                           5
Total Job/Logon violations                          1
Total Job/Logon attempts by undefined users         0
Total Job/Logon successful terminations             2

                                      --- Resource Statistics ---
Total resource accesses (all events)                2
Total resource access successes                     1
Total resource access violations                    1
```

Basic Security Manager – Repositories

- VSE Control File (IESCNTL)
  - VSAM KSDS file
  - Contains all user profiles
- DTSECTAB
  - Contains resources like files, libraries, sub libraries and members
  - Only 2 user ids are still needed in DTSECTAB
    - (FORSEC, DUMMY)
- DTSECTXN (replaced by BSM Control File)
  - Transaction security profiles
  - Dialog (28) to define the profiles
- BSM Control File
  - Resource Profiles
  - Password rules
  - User groups

Basic Security Manager – User Profiles

- VSE Control File (IESCNTL)
  - All Users must be defined here (SNT no longer supported by CICS TS)
  - VSE/ESA 2.4 (or above) Control File records are NOT compatible with previous releases
  - New: description field
  - Definition
    - User Maintenance Dialog (211)
    - Batch utility IESUPDCF
- DTSECTAB
  - Contains 2 user ids for ASI procedure
  - No CICS TS user settings

Basic Security Manager – User Groups

- User Groups are stored in BSM Control File
- User IDs can be added (connected) into a group
- Replaces the security classes for CICS resources
- Definition
  - Security Maintenance Dialogs (282)
  - Batch utility BSTADMIN

Migrating to the new BSM Resource Profiles

- DTSECTXN no longer used
  - Use the new BSM Control File to protect CICS resources
- Migration steps:
  - Create group profiles from existing User-IDs
    - User Maintenance Dialog 211 – press PF6
    - Creates a group for each security class (GROUP01-GROUP64)
  - Migrate DTSECTXN definitions
    - Use Migrate Security Entries Dialog 285
- Detailed description:
  - See Administration Guide

Administrating new BSM resources

- BSTADMIN provides command to administrate the new BSM profiles
  - From the console in a PAUSE job
  - In a batch job
- Commands
  - ADD, CHANGE, DELETE
  - ADDGROUP, CHNGROUP, DELGROUP
  - CONNECT, REMOVE
  - LIST, LISTG, LISTU
  - PERFORM
  - STATUS
- Security Maintenance Dialogs – 28x

Password rules

- Password rules can be changed
  - Use BSTADMIN

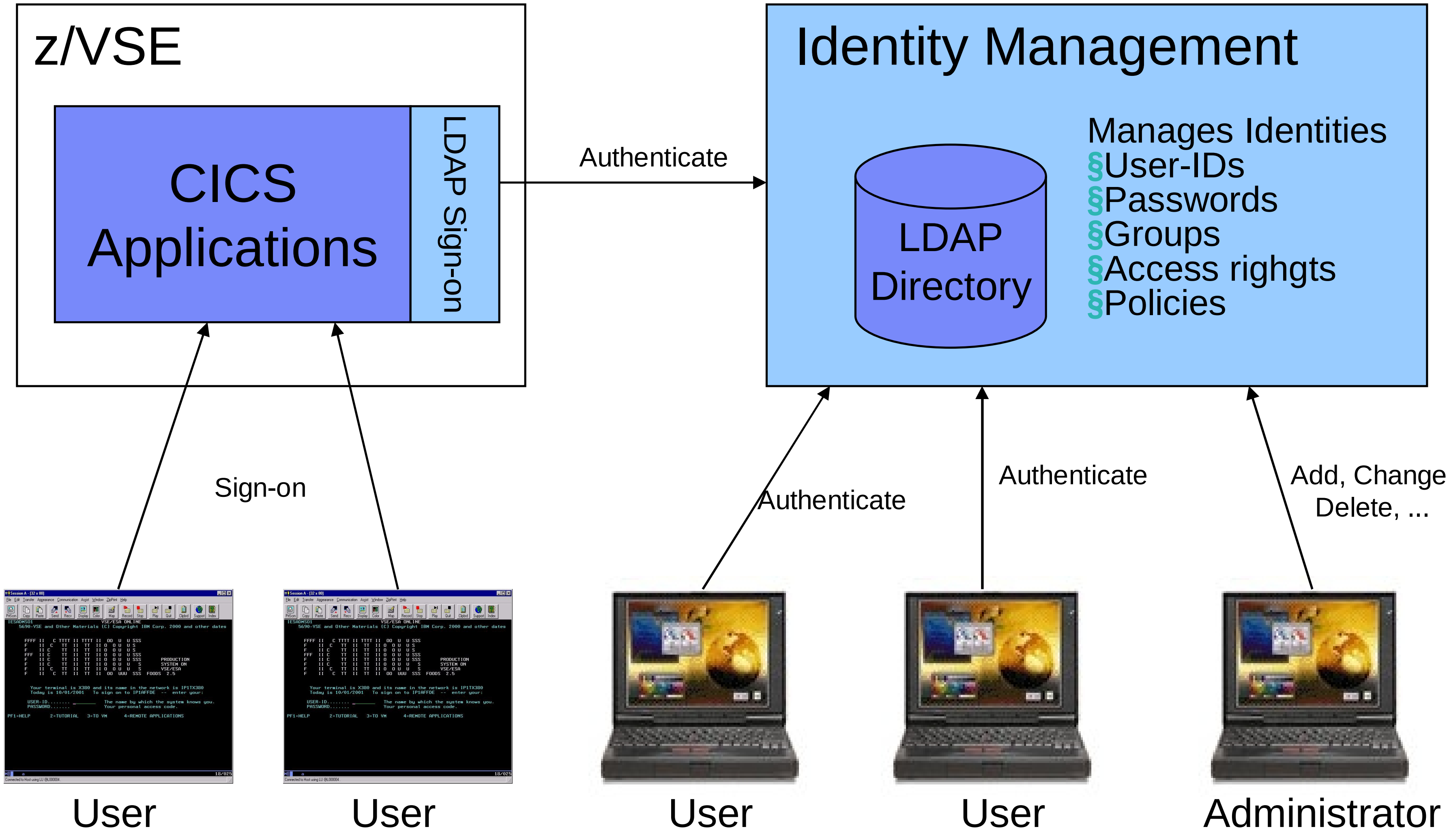
    ```
    PERFORM PASSWORD HISTORY|NOHISTORY
                     LENGTH(5)
                     REVOKE(4)
                     WARNING(3)
    ```
  - HISTORY: a password history is maintained
  - LENGTH: minimum password length of password
  - WARNING: number of days a warning is displayed before password is expired
  - REVOKE: number of unsuccessful sign-on attempts before user id is revoked
- Do not use IESIRCVT anymore !
  - Remove it from USERBG.PROC

LDAP Signon Support - New with z/VSE 4.2

- The LDAP sign-on support enables users to sign on to z/VSE using long, “company-wide” (corporate) user-IDs and passwords
  - The userid and password are authenticated using an LDAP server that is reachable via the TCP/IP network

- This use of “company-wide” user-IDs connects z/VSE with the centralized management of user-IDs
  - LDAP authorization is designed to integrate z/VSE into “Identity Management Systems”, such as IBM Tivoli products

LDAP Signon Support - The big picture



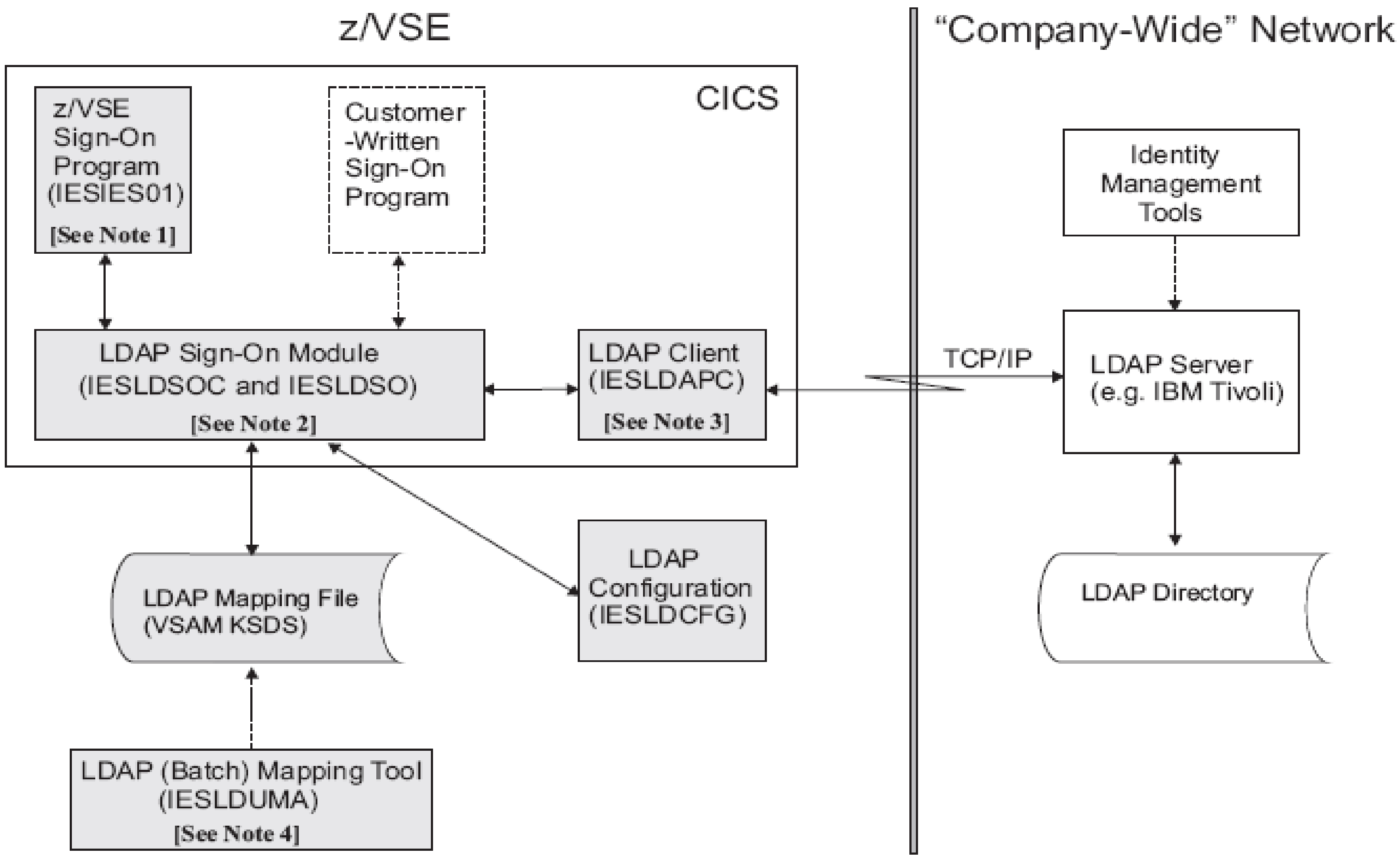
LDAP Signon Support - Signon process

- LDAP Signon Support sits on top of any existing Security Manager
  - It can be used with the Basic Security Manager (BSM)
  - As well as an External Security Manager (ESM)

- Signon process (simplified)
  1. It first authenticates an user against a remote LDAP server
     - Via LDAP Bind and Search operations
  2. Then it maps the LDAP user to a short VSE user
     - Using a LDAP User Mapping File
  3. Finally passes the short VSE user and password to the existing signon process (BSM or ESM)

- Currently only available for CICS signon

LDAP Signon Support - New with z/VSE 4.2


z/VSE
"Company-Wide" Network
CICS
z/VSE Sign-On Program (IESIES01)
[See Note 1]
Customer -Written Sign-On Program
LDAP Sign-On Module (IESLDSOC and IESLDSO)
[See Note 2]
LDAP Client (IESLDAPC)
[See Note 3]
TCP/IP
Identity Management Tools
LDAP Server (e.g. IBM Tivoli)
LDAP Directory
LDAP Mapping File (VSAM KSDS)
LDAP Configuration (IESLDCFG)
LDAP (Batch) Mapping Tool (IESLDUMA)
[See Note 4]

LDAP Signon Support - What is LDAP ?

- The Lightweight Directory Access Protocol (LDAP) is an application protocol for querying and modifying directory services running over TCP/IP
  - A directory is a set of objects with similar attributes organized in a logical and hierarchical manner.
    - The most common example is the telephone directory, which consists of a series of names (either of persons or organizations) organized alphabetically, with each name having an address and phone number attached.
- Due to this basic design (among other factors) LDAP is often used by other services for authentication
- An LDAP directory tree often reflects various political, geographic, and/or organizational boundaries, depending on the model chosen

LDAP Signon Support - What is LDAP ?

§ LDAP Terms:

- **Directory**
  - A tree of directory entries.
- **Entry**
  - An entry consists of a set of attributes.
  - Each entry has a unique identifier: its Distinguished Name (DN).
- **Attribute**
  - An attribute has a name (an attribute type or attribute description) and one or more values. The attributes are defined in a schema
- **Schema**
  - The schema defines the attribute types that directory entries can contain.
- **Distinguished Name**
  - Full qualified nyme in an LDAP directory tree.
  - Consists of its Relative Distinguished Name (RDN) constructed from some attribute(s) in the entry, followed by the parent entry's DN.
  - Think of the DN as a full filename and the RDN as a relative filename in a folder.
  - Using the DN the object can be identified
  - Example: `uid=104903724,c=de,ou=bluepages,o=ibm.com`

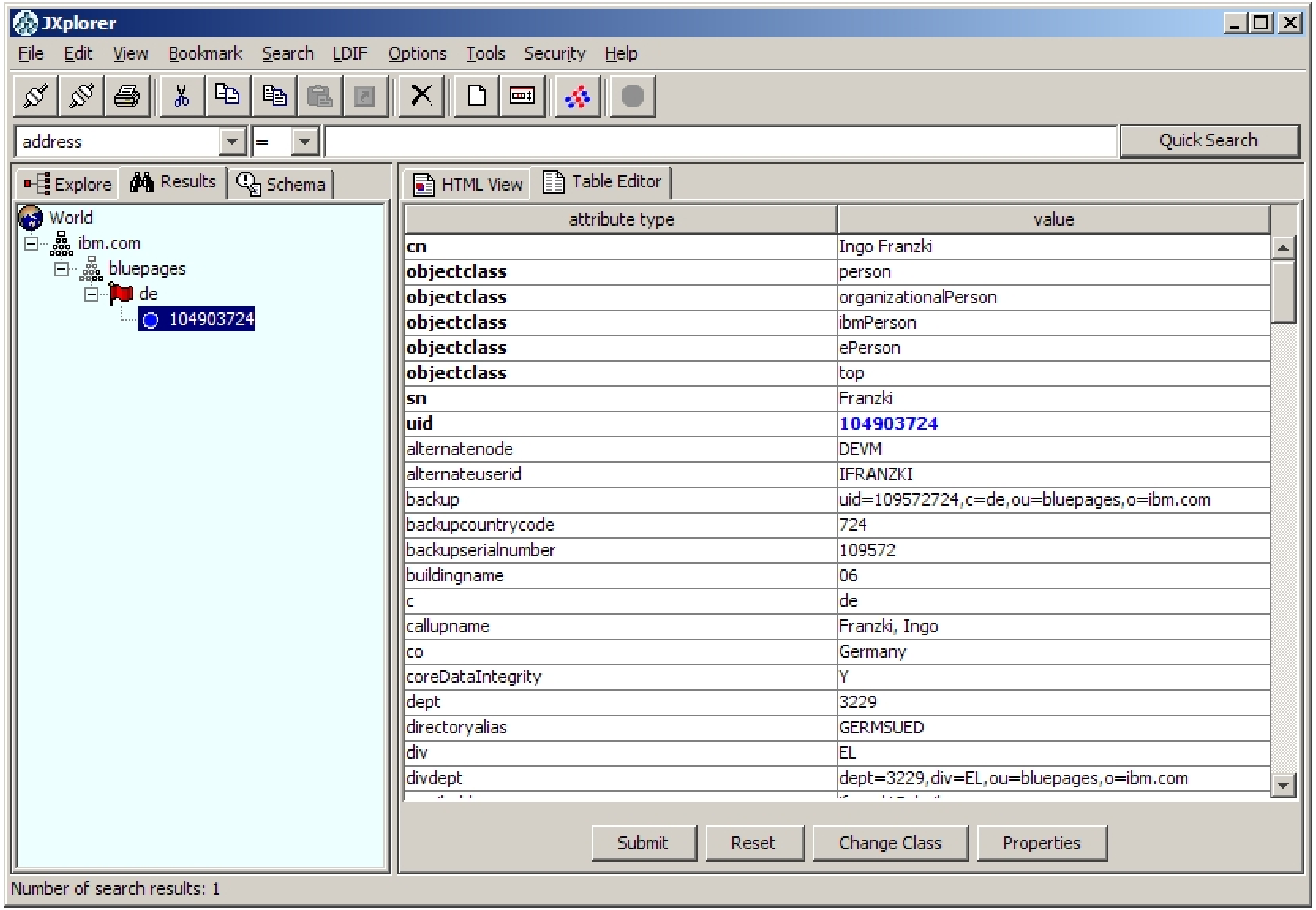
LDAP Signon Support - LDAP operations

- Bind (authenticate)
  - The Bind operation authenticates the client to the server.
  - Simple Bind can send the user's DN and password in plaintext, so the connection should be protected using Transport Layer Security (TLS).
  - The server typically checks the password against the userPassword attribute in the named entry.
  - Anonymous Bind (with empty DN and password) resets the connection to anonymous state.
  - Bind also sets the LDAP protocol version. Normally clients should use LDAPv3, which is the default in the protocol but not always in LDAP libraries

LDAP Signon Support - LDAP operations

- Search
  - The Search operation is used to both search for and read entries. Its parameters are:
    - **baseObject**
      - The DN (Distinguished Name) of the entry at which to start the search,
    - **scope**
      - BaseObject (search just the named entry, typically used to read one entry), singleLevel (entries immediately below the base DN), or wholeSubtree (the entire subtree starting at the base DN).
    - **filter**
      - How to examine each entry in the scope. E.g. (&(objectClass=person)(|(givenName=John)(mail=john*))) - search for persons who either have given name John or an e-mail address starting with john.
    - **derefAliases**
      - Whether and how to follow alias entries (entries which refer to other entries),
    - **attributes**
      - Which attributes to return in result entries.
    - **sizeLimit, timeLimit**
      - Max number of entries, and max search time.
    - **typesOnly**
      - Return attribute types only, not attribute values.
  - The server returns the matching entries and maybe continuation references (in any order), followed by the final result with the result code.

LDAP Signon Support - Example: IBM Bluepages

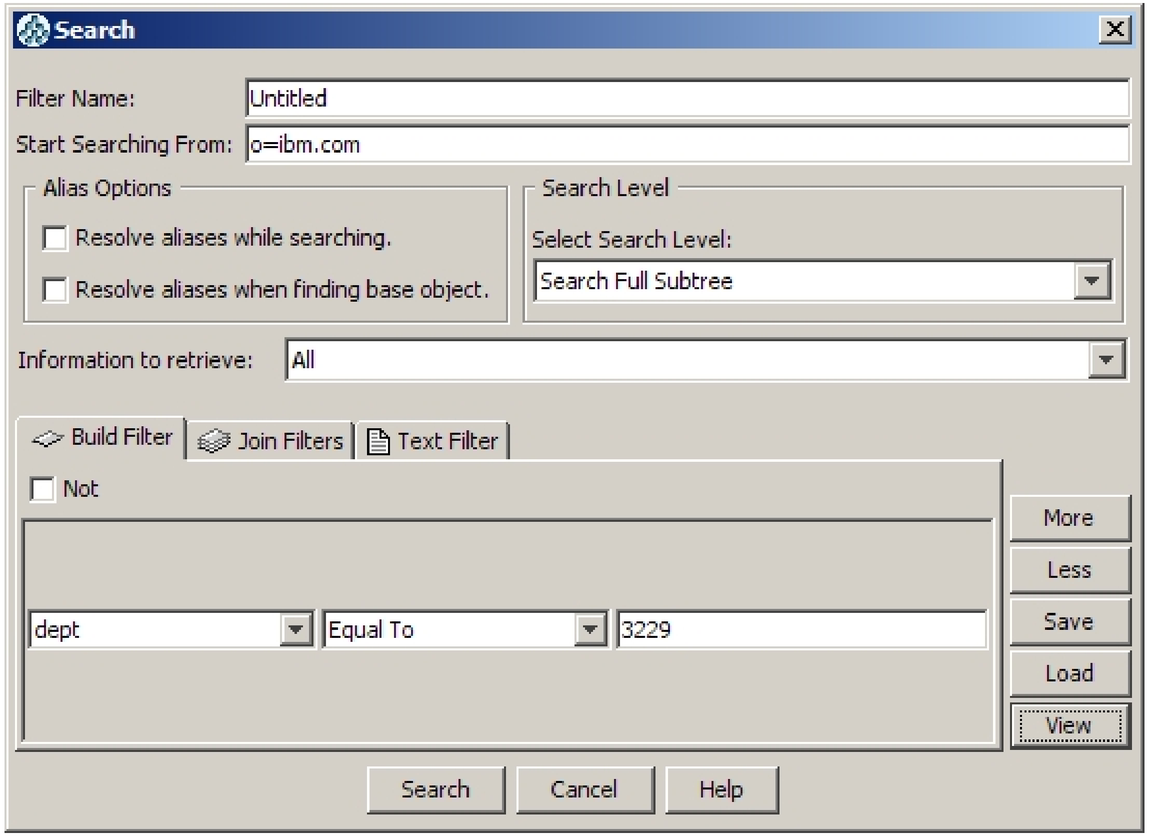


attribute type	value
cn	Ingo Franzki
objectclass	person
objectclass	organizationalPerson
objectclass	ibmPerson
objectclass	ePerson
objectclass	top
sn	Franzki
uid	**104903724**
alternatenode	DEVM
alternateuserid	IFRANZKI
backup	uid=109572724,c=de,ou=bluepages,o=ibm.com
backupcountrycode	724
backupserialnumber	109572
buildingname	06
c	de
callupname	Franzki, Ingo
co	Germany
coreDataIntegrity	Y
dept	3229
directoryalias	GERMSUED
div	EL
divdept	dept=3229,div=EL,ou=bluepages,o=ibm.com

Number of search results: 1

LDAP Signon Support - Example: IBM Bluepages

- Search for all Entries with „dept=3229“



Search

Filter Name: Untitled

Start Searching From: o=ibm.com

Alias Options

□ Resolve aliases while searching.

□ Resolve aliases when finding base object.

Search Level

Select Search Level: Search Full Subtree

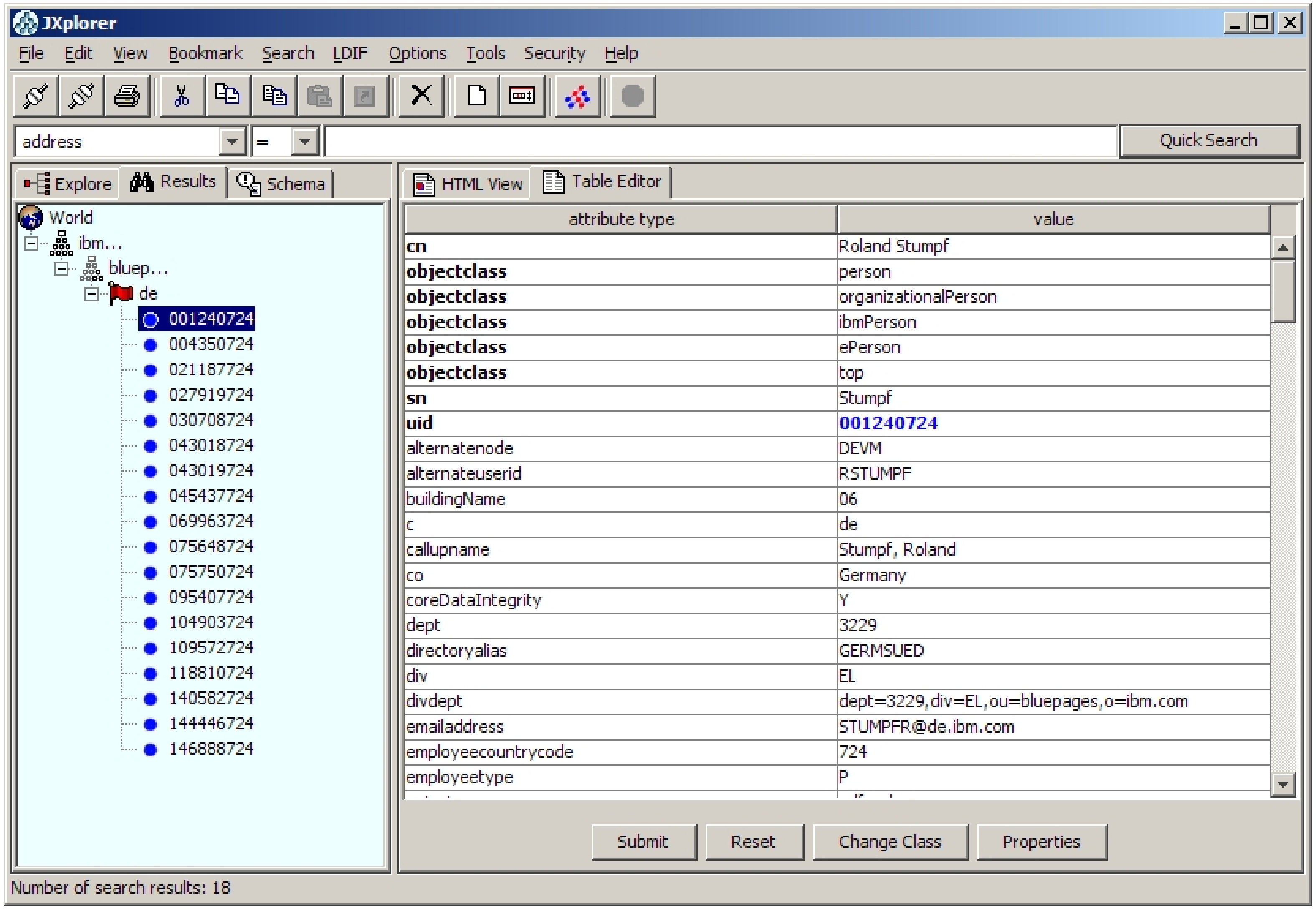
Information to retrieve: All

Build Filter | Join Filters | Text Filter

□ Not

dept | Equal To | 3229

LDAP Signon Support - Example: IBM Bluepages



- World
  - ibm...
    - bluep...
      - de
        - 001240724
        - 004350724
        - 021187724
        - 027919724
        - 030708724
        - 043018724
        - 043019724
        - 045437724
        - 069963724
        - 075648724
        - 075750724
        - 095407724
        - 104903724
        - 109572724
        - 118810724
        - 140582724
        - 144446724
        - 146888724

attribute type	value
cn	Roland Stumpf
objectclass	person
objectclass	organizationalPerson
objectclass	ibmPerson
objectclass	ePerson
objectclass	top
sn	Stumpf
uid	**001240724**
alternatenode	DEVM
alternateuserid	RSTUMPF
buildingName	06
c	de
callupname	Stumpf, Roland
co	Germany
coreDataIntegrity	Y
dept	3229
directoryalias	GERMSUED
div	EL
divdept	dept=3229,div=EL,ou=bluepages,o=ibm.com
emailaddress	STUMPFR@de.ibm.com
employeecountrycode	724
employeetype	P

Number of search results: 18

LDAP Signon Support - LDAP Servers

- IBM Tivoli Directory Server
- z/VM LDAP Server
- Microsoft Active Directory
- OpenLDAP
- Apache Directory Server
- Apple Open Directory
- CA Directory from CA, Inc. (formerly eTrust Directory)
- Fedora Directory Server (Red Hat Directory Server)
- MXMS, from Atos Origin
- M-Vault, from Isode Limited
- Novell eDirectory
- OneLDAP
- OpenDS
- Oracle Internet Directory
- Penrose - a Java-based Virtual Directory Server.
- Siemens DirX
- SIDVault
- Sun Java System Directory Server
- ....
- (And many more)

LDAP Signon Support - User Mapping File

- VSAM KSDS file used to store the user-ID mappings
  - LDAP Users & Passwords: up to 64 characters
  - VSE Users 6 Passwords: up to 8 characters

- The LDAP mapping file contains:
  - Records containing user-IDs that are to be used for LDAP-authentication
    - Contain a mapping of a long-user-ID (used in the LDAP environment) to a short-user-ID (used in z/VSE)
    - These user-IDs are referred to as being LDAP-enabled.
  - Records containing user-IDs that are not used for LDAP-authentication (for example, the SYSA user-ID)
    - These user-IDs are referred to as being not LDAP-enabled, and these users can sign on to z/VSE even if the LDAP server is not operational.

- Maintained using batch tool IESLDUMA

LDAP Signon Support - LDAP Password cache

- Authentication against a remote LDAP server can be time consuming (requires network communication)
- When a user signs on multiple times within a short period of time, it is very unlikely that the LDAP password has changed
- If caching is enabled, a shortpath is used to authenticate a user
  - A password hash (SHA-256) of the last sucessfull signon attempt (LDAP bind) is stored in the User Mapping File
    - There is no way to recover the password from a hash
  - A subsequent signon request builds the password hash, and compares the hash against the stored hash
    - If it is the same, the user has entered the same password
  - A stored password hash has an expiration period. When it is over, a full LDAP signon (LDAP bind) is enforced

LDAP Signon Support - LDAP Configuration

- Per default, LDAP signon is not enabled.
- You need to create a configuration to enable LDAP signon support
  - Use Skeleton SKLDCFG in ICCF library 59
- Specifies (summary)
  - DLBL Name of LDAP User Mapping File (default: IESLDUM)
  - IPs or hostnames of one or multiple LDAP Servers
  - Settings for Authentication method (see next foils)
  - Settings for Cache usage and expiration
  - Settings for Secure Socket Layer (SSL)

LDAP Signon Support - Authentication Methods

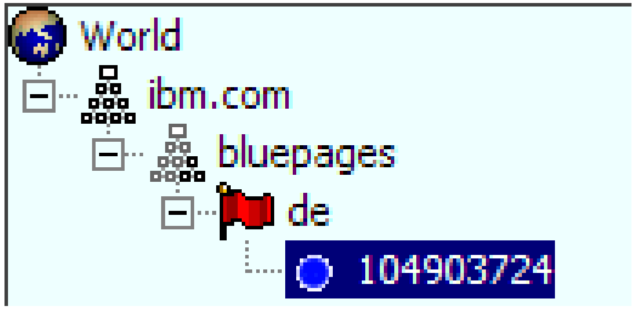
- LDAP Authentication relies on the LDAP bind operation with distinguished name (DN) and password

- **Direct Authentication:**
  - The specified user-ID is used directly for the LDAP bind operation.
  - A pattern is used to build the distinguished name for the bind, e.g. „cn=%u,dc=ibm,dc=com“

- **Search Authentication:**
  - In case the specified user-ID cannot be used directly for bind.
  - Instead, a LDAP search operations is performed first using the attribute that is specified in the configuration (e.g. „email“).
  - An additional search filter can be specified to further limit the search result, e.g. „dept=3229“
  - The search result’s distinguished name is then used for the LDAP bind operation.

LDAP Authentication Examples with IBM Bluepages

- LDAP Server: bluepages.ibm.com



World
ibm.com
bluepages
de
104903724

- Direct Authentication:
  - DN would be "**uid=104903724,c=de,ou=bluepages,o=ibm.com**"
  - So pattern would be „**uid=%u,c=de,ou=bluepages,o=ibm.com**"
  - LDAP User ID would be IBM personal number: „**104903724**"
  - LDAP Bind will be performed with „**uid=104903724,c=de,ou=bluepages,o=ibm.com"** and the specified password

LDAP Authentication Examples with IBM Bluepages

- Search Authentication:
  - Every person entry has an attribute named „**email**“ that contains the user‘s email address
  - BaseDN for search (start of search) would be „**ou=bluepages,o=ibm.com**“
  - Additional search filter either empty (no filter) or „**dept=3229**“ if search should be limited to persons in department 3229
  - LDAP User ID would be email address: „**ifranzki@de.ibm.com**“
  - LDAP Search will be:
    - Start at „**ou=bluepages,o=ibm.com“** and look for entries where **email=ifranzki@de.ibm.com & dept=3229**
    - Result will be just me, i.e. My DN: **uid=104903724,c=de,ou=bluepages,o=ibm.com**
  - LDAP Bind will be performed with „**uid=104903724,c=de,ou=bluepages,o=ibm.com“** and the specified password

LDAP Signon Support - Strict-Mode vs Non-Strict-Mode

- Controls what happens if a user tries to sign on, but the user is not found in the mapping file
- If the record containing the user-ID mapping is not found and LDAP is operated in:
  - Strict-mode, the sign-on attempt is rejected.
    - All users must be contained in the maypping file
  - Non-Strict mode and the user-ID and password are both less than or equal to 8 characters, a mapping of user-IDs does not take place.
    - The sign-on attempt is then sent “unchanged” to the security manager
    - Signon possible in case short VSE user and password are known
  - Non-Strict mode and the user-ID and/or password are greater than 8 characters, the sign-on attempt is rejected.

LDAP Signon Support - Strict-Mode vs Non-Strict-Mode

- Considerations and recommendations
  - If running in Strict-Mode:
    - Define your administrators and operators (SYSA, OPER, ...) in the: user mapping file as not LDAP enabled
      - To allow signon even if LDAP server is not available
    - Prevents other users from signing on even if they know their short VSE userid and password
      - Forces them to use LDAP user id and LDAP password
  - If running in Non-Strict-Mode:
    - As long as the VSE userid and password are know, signon is possible, without communicating with the LDAP server
      - Good for Administrators & Operators to fix a problem
      - Possible security risk for other users, since they bypass corporate security policies normally enforced by the LDAP server

LDAP Signon Support - Generating VSE passwords for LDAP users

- After a user-ID has been LDAP-enabled, this user should no longer be able to perform a sign-on using his/her short-user-ID
  - Doing so would bypass the company's security policies that are enforced by the LDAP-authentication.
- When enabling a user-ID for LDAP authentication, a new z/VSE password can be randomly generated
  - See GENPWD parameter for IESLDUMA
- The user will never know the randomly-generated password
  - Therefore, he/she will not be able to perform a sign-on using the short-user-ID
- You should set the passwords for short-user-IDs that are LDAP-enabled to non-expiring
  - For such short-user-IDs, password expiration should be enforced by the LDAP server based on the long-user-ID and long-password.
- You should not generate a password for SYSA type users
  - They have to be able to signon with the short userid to solve problems

LDAP Signon Support - Using your own CICS Sign-on program

- The Interactive Interface signon program (IESIES01) has been adapted to support LDAP authentication
  - If LDAP authentication is configured and enabled, it will automatically show longer fields for userid and password

- If you use your own sign-on program, you need to adapt it to use LDAP sign-on support:
  - Enlarge fields in screen (BMS map) for userid and password
  - Support case sensitive input
  - Call LDAP Sign-on Program IESLDSOC to perform LDAP authentication
    - Using EXEC CICS LINK with COMMAREA (see Admin Guide)
  - Sample CICS Sign-on Program supporting LDAP is available on request (zvse@de.ibm.com) or on z/VSE web page

LDAP Signon Support - Restrictions

- No support for using long-user-IDs in the ID statement within batch jobs
  - ID statements can only use a short-user-ID and short-password (a “z/VSE” user-ID and password).
- LDAP sign-on is only possible using a CICS sign-on panel.
  - The z/VSE-provided LDAP sign-on panel (IUI signon)
  - A customer-written sign-on panel.
- Only LDAP Authentication (using Bind) is supported
  - Kerberous authentication (often used by MS Active Directory) is not supported

LDAP Tools and Documentation

- LDAP Browser
  - JXplorer (http://www.jxplorer.org/)
- z/VSE Manuals:
  - **Planning:** Subchapter in chapter 18. Security and Encryption Support: LDAP Sign-On Support
  - **Administration:** Chapter 45. Maintaining User Profiles in an LDAP Environment
- Internet:
  - Wikipedia: http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

CICS Security

- CICS/VSE uses SNT for user verification
  - Duplicate user definitions
  - SNT users can not change password

- CICS TS uses RACROUTE calls for
  - Sign on
  - Resource Security
  - Transaction Security

CICS TS Sign on

- Native CICS TS sign on (CESN)
- VSE/Interactive Interface sign on (IEGM)
- Private sign on programs based on CICS SIGNON

- Sign on characteristics
  - Inherit user identification and password verification by Security Manager
  - CICS TS and Interactive Interface extracts subsystem specific user settings
    - CICS: Operator ID, Operator classes, ...
    - II: User type, Initial panel, access flags, ...
  - No user definitions to subsystems necessary

CICS TS Resource Security

- Most CICS TS resources can be protected now
  - Protection via Resource Classes and Resource Profiles, held in VSE.BSTCNTL.FILE
  - Transactions – as in previous releases
  - Programs, Files, Journals, Temporary storage, Transient data, Start Transactions, VTAM Applications, miscellaneous resources
- This is similar to Resource Level Checking under CICS/VSE
  - RSLC=YES defined within a transaction
  - RSLKEY defined for
    - Users being allowed to access protected resources
    - Resources for being allowed to be accessed

CICS TS Resource Security

- **Resource security definitions under CICS TS**
  - **DFHSIT**

• SEC=YES	Enables security
• XTRAN=YES	Resource Class TCICSTRN
• XDCT=YES	Resource Class DCICSDCT
• XFCT=YES	Resource Class FCICSFCT
• XJCT=YES	Resource Class JCICSJCT
• XPCT=YES	Resource Class ACICSPCT
• XPPT=YES	Resource Class MCICSPPT
• XTST=YES	Resource Class SCICSTST

CICS TS Resource Security

- Resource security definitions under CICS TS
  - Definition within single resource definition (e.g. file FILEA and FILEB)
    - Within DEFINE FILE: RESSEC(YES)
    - With BSTADMIN Resource Profiles for Resource Class FCICSFCT:
      - ADD FCICSFCT FILEA UACC(NONE)   (resource = FILEA)
      - ADD FCICSFCT FILEB UACC(NONE)   (resource = FILEB)
      - PERMIT FCICSFCT FILEA(GROUP1) ACCESS(UPDATE)
      - PERMIT FCICSFCT FILEB(GROUP1) ACCESS(READ)

CICS TS Resource Security

- **Enhancement for Report Controller Facility (RCF) to browse reports**
  - **Access protection under CICS/VSE 2.3**
    - RSLKEY for program DFHPSBRS – just 1 level of protection for all repots
    - All users with that RSLKEY can access all reports
  - **Access protection under CICS TS 1.1.1 (requires APAR PK11491)**
    - RSL concept retained for compatibility reasons
      - RSL keyword within SPOOLOPEN REPORT unchanged
    - For browsing purposes profile names
      - DFHRCF.BRSL01 – DFHRCF.BRSL24
    - There are 24 levels for browse protection now –
      - user must be authorized on access list of these related profiles DFHRCF.BRSLxx (RSLxx within SPOOLOPEN)
    - Protection based on report, not on browse program
  - **Definition for RCF protection**
      - ADD FACILITY DFHRCF.RSLnn UACC(NONE)
      - PERMIT FACILITY DFHRCF.RSLnn ID(usergroup1) ACCESS(READ)

CICS Security - Prefixing

- CICS Prefixing can be used to differentiate between two or more CICS TS running on the same VSE system

- CICS Prefix is identical with the user id of the CICS startup job
  - SECPRFX=YES in SIT
  - SYS SEC=YES: user id in * $$ JOB or ID statement is used
  - SYS SEC=NO: user id in ID statement is used
  - When no user id is given: FORSEC is used

CICS Security - DTSECTXN Macro

- Macro to support CICS transaction profiles
  - Replaced by new BSM Control File
    - Can still be used for compatibility
  - CICS-region = user id in CICS startup job
  - transid = up to 4 characters
  - class = 1-64
  - 1 = public transactions
  - 64 = interactive interface transactions

```
DTSECTXN NAME={CICS-region.}transid,
         TRANSEC=(class)
         [,SUBTYPE={INITIAL | FINAL}]
         [,TYPE=GENERIC]
```

CICS Security - Coexistence

- Exit program for CICS/VSE to do user verification against BSM user profiles
- DFHXSE and DFHXSSCO in PRD1.BASE
  - Requires RACROUTE macro from GENLIB
- Requires default user entry in SNT
- Activate ESM in CICS/VSE
  - EXTSEC=YES in SIT

CICS Security – Migration from CICS/VSE

- Security related resource to be migrated
  - Interactive Interface user profiles from an old VSE control file
  - ICCF user records in DTSFILE
  - CICS user profiles from a CICS/VSE sign on table (SNT)
  - Transaction definitions from CICS/VSE PCT
  - For Batch security users: DTSECTAB
  - VSE migration utility IESBLDUP
  - migrate user profiles

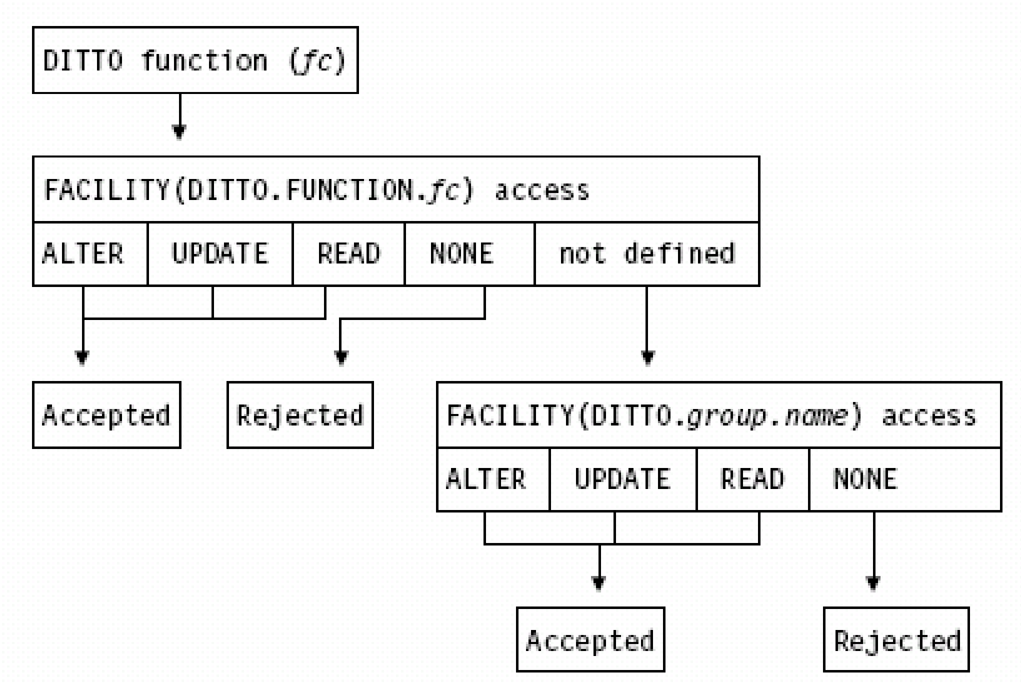
- see VSE System Utilities manual

Batch Security

- ID statement or * $$ JOB specifies user id and password for a job
- User id and password are verified against
  - DTSECTAB
  - Security Manager (RACROUTE)
- Subsystems (LIBR, VSAM, ...) uses this user id to verify access rights against DTSECTAB

DITTO Security

- DITTO uses the FACILITY profiles to protect access to data



DITTO function (*fc*)

FACILITY(DITTO.FUNCTION.*fc*) access

ALTER UPDATE READ NONE not defined

Accepted

Rejected

FACILITY(DITTO.*group.name*) access

ALTER UPDATE READ NONE

Accepted

Rejected

- Make sure batch security is active
  - IPL SEC=YES
- Make sure you define the FACILITY profiles
- ALTER, UPDATE and READ means accepted, NONE means rejected

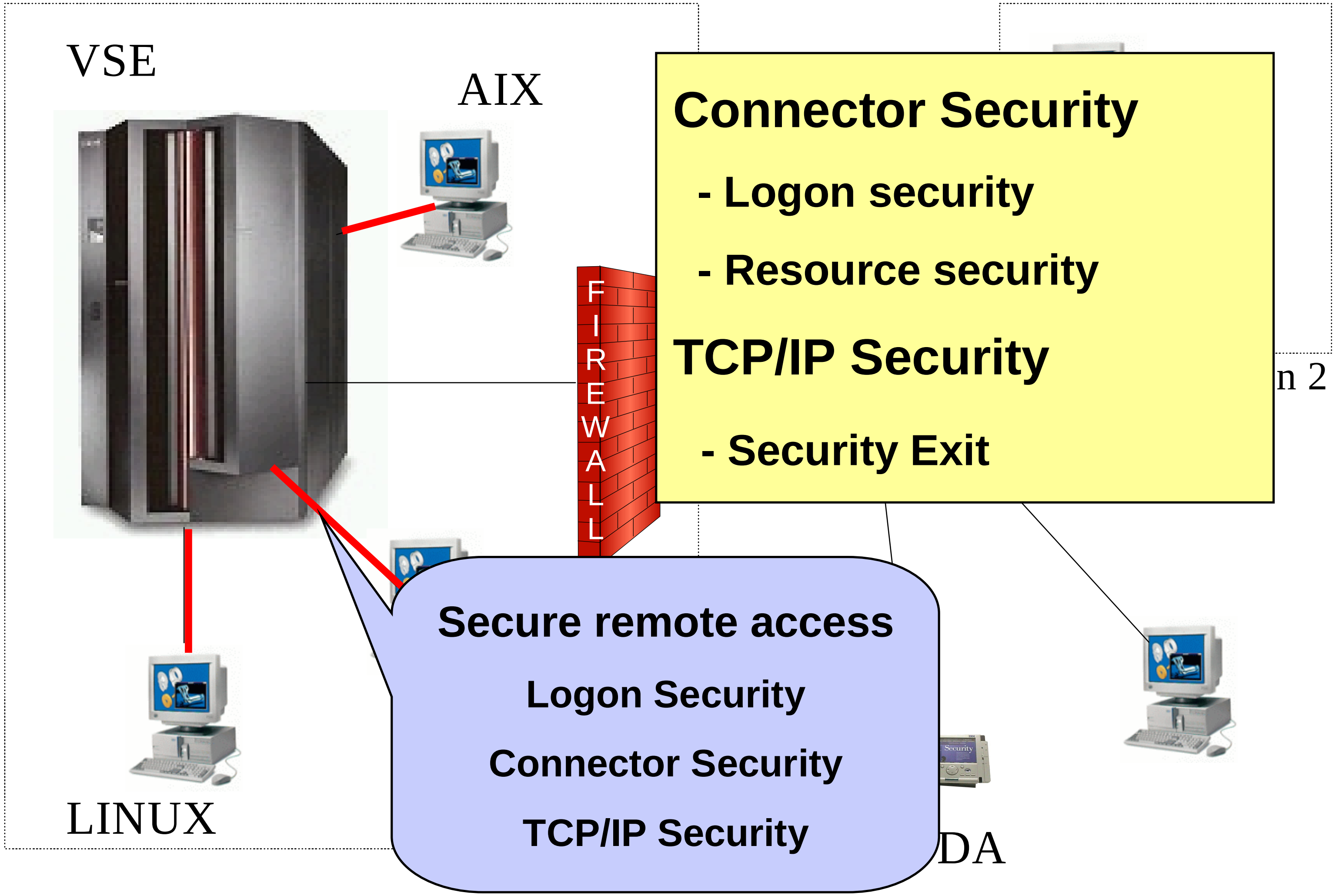
Security Checklist for VSE

- SYS SEC=YES/NO
  - YES if batch security is required

- CICS SIT SEC=YES (!)
  - If NO, all users can logon without a password

- Change passwords for predefined users
  - POST, PROG, OPER, SYSA, ...

Security in a heterogeneous environment



Connector Security

- **Logon security**
- **Resource security**

TCP/IP Security

- **Security Exit**

Secure remote access

Logon Security

Connector Security

TCP/IP Security

Why secure remote access ?

- Today most computers are part of a network
  - Can connect to your VSE system
- Prevent unauthorized access to VSE and data
  - Requires to authenticate the user (logon)
- FTP allows to access production data
  - VSAM
  - POWER entries (listings)

Connector Security

- VSE Connector Server acts as a Resource Manager
  - Issues RACROUTE calls for
    - User id and password verification
    - Resource security
- Connector user ids are the same as for CICS TS and Batch
- No additional user profile setup required

- But:
  - Additional access restriction by user id and/or IP address possible

Connector Security - Logon

- VSE Connector Server requires a client to logon with valid user id and password
- User id and password is checked via RACROUTE calls
- Additional information is extracted from ACEE and IUI or AF segment
  - User type, access flags, ...
- The user's ACEE is kept during the whole session
- Used to do resource access checking
- Multiple logon attempts with same userid is possible

Connector Security – Resource Security

- When a client issues a resource access request
  - The server does RACROUTE calls to check if the user is allowed to access the resource
  - Access is done only if user is allowed to access the resource
- VSE Connector Server runs under a special userid (VCSRV)
  - specified in ID statement in startup job
  - should be allowed to access all resources

Connector Security - Internals

- Logon processing
  - RACROUTE VERIFY CREATE
  - RACROUTE EXTRACT (user type checking)
    - AF segment, if this fails (e.g. CA-TopSecret)
  - IUI segment
  - Flags used in AF segment

AFADMIN	user is a administrator = type 1
AFMCONS	user is allowed to open a console

  - Flags used in IUI segment

IESISUTP	user type (1,2 or 3)
IESISFL1	user flag byte 1
IESISFL2	user flag byte 2

Connector Security - User types

- Type 1 (Administrator)
  - read and write access for all resources
- Type 2 (Programmer)
  - read only access for all resources
  - allowed to submit jobs
- Type 3 (Application User)
  - read only access for selected resources

Connector Security – Resource classes

- The following Resource class are used
  - VSELIB, VSESLIB, VSEMEM (LIBR)
  - DATASET (VSAM)
- Resource not protected by Security Manager
  - POWER queue entries
    - protected by user type and access flag
  - Console
    - protected by user type and access flag
    - If user is allowed to access the console, he can issue all console commands, even REIPL NOPROMPT (!)
  - ICCF Libraries and Members
  - VSAM Record Mappings

Connector Security – Additional Security

- Configuration member allows to restrict logon (connect) by
  - User id
  - IP address
- See skeleton SKVCSUSR in ICCF library 59

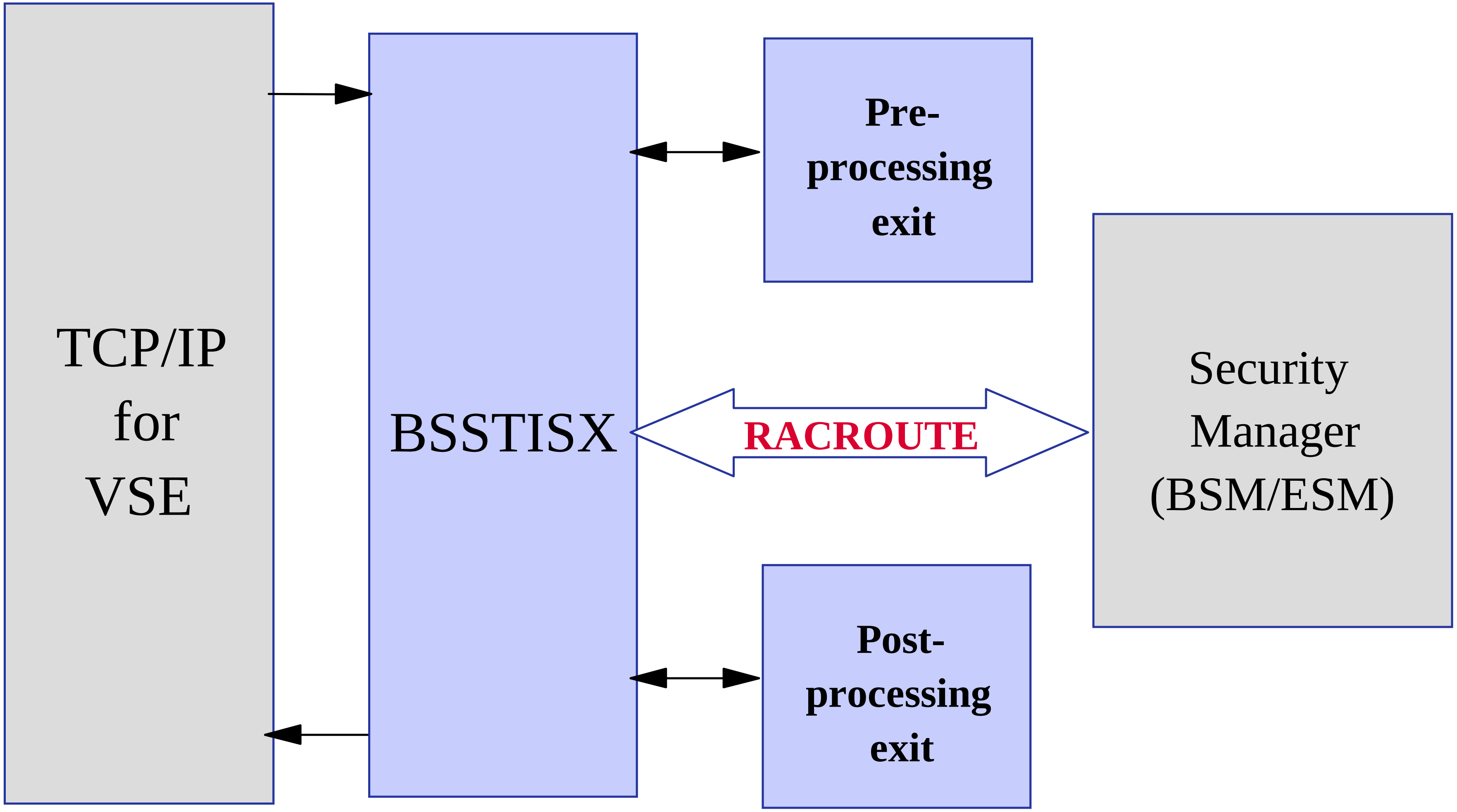
```
* *******************************************************************
* USERS FROM THIS IP'S ARE ALLOWED TO LOGON
* *******************************************************************
IP   = *,             LOGON = ALLOWED
* IP = 9.164.123.456, LOGON = DENIED
* IP = 9.165.*      , LOGON = DENIED
* IP = 10.0.0.*     , LOGON = ALLOWED
* *******************************************************************
* THIS USERS ARE ALLOWED TO LOGON
* *******************************************************************
USER = *,             LOGON = ALLOWED
* USER = BOBY,        LOGON = ALLOWED
* USER = SYS*,        LOGON = DENIED
```

TCP/IP Security

- In general TCP/IP uses its own user id definitions
  - DEFINE USER,ID=user,PASSWORD=pwd
  - Readable in initialization member (IPINITxx.L)
  - Duplicate user definitions

- Security Exit available from IBM to check the user ids and resource access via Security Manager

TCP/IP Security Exit



TCP/IP Security Exit

- Issues RACROUTE calls for
  - User identification and verification
  - Resource access control
    - VSE files, libraries, members
    - POWER entries
    - SITE commands
- Provides a pre- and post-processing exit interface
  - Activation
    - DEFINE SECURITY,DRIVER=BSSTISX[,DATA=data]
      - DATA=‘anonym_uid,anonym_pwd,preproc,postproc’
  - SET SECURITY=ON
- For details see VSE/ESA Software Newsletter #20 (First/Second Quarter, 2000)

TCP/IP Security - HTTPHACK.L

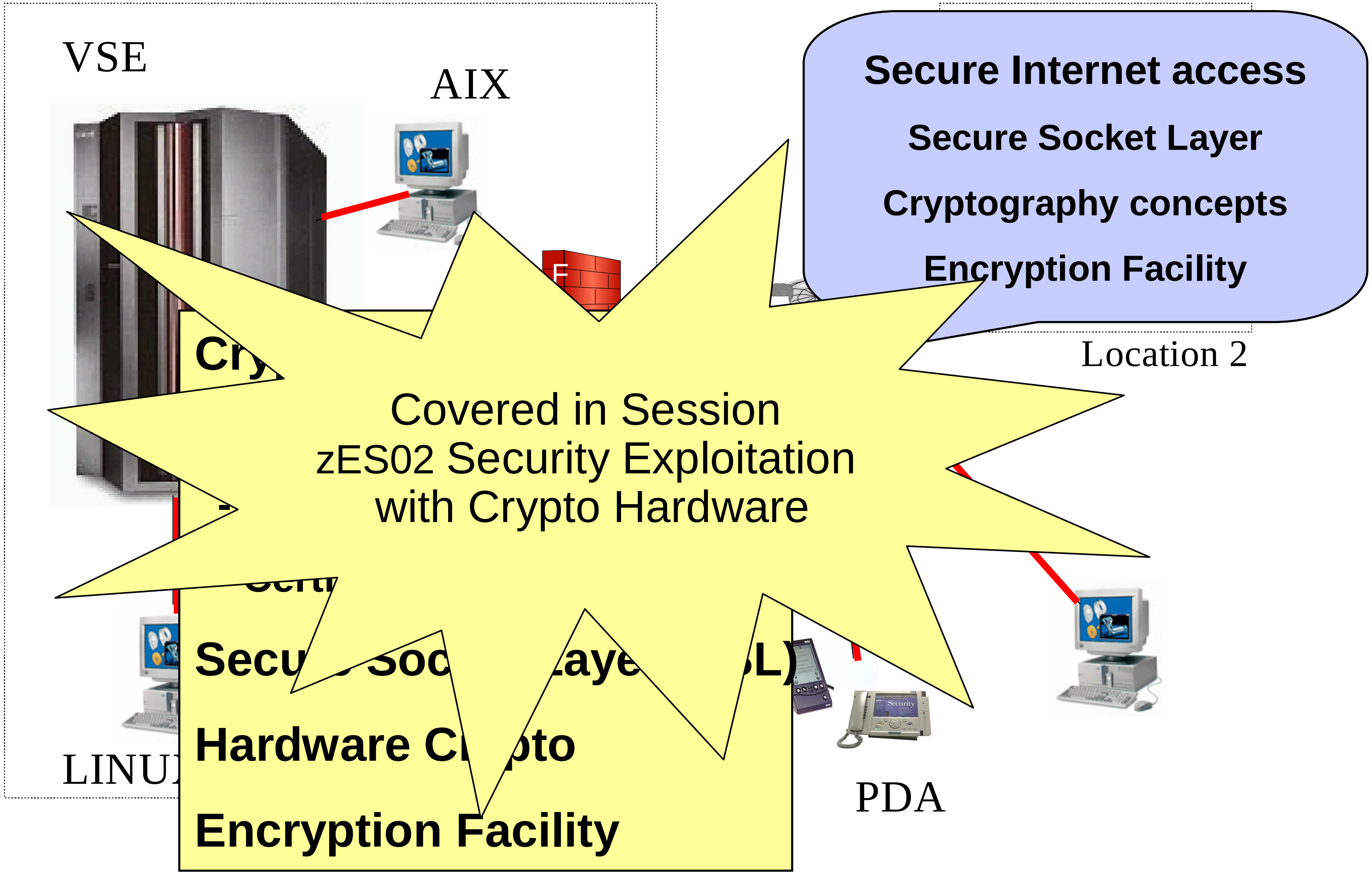
- Typical hacker attacks are normally no problem for VSE, only for Windows
- Rejects hacker attacks
  - by filtering known URL prefixes
- HTTPHACK.L:

```
* Example:
*
* "SCRIPTS/" will cover...
*       GET /SCRIPTS/ROOT.EXE?C+D
*       GET /SCRIPTS/ROOT.EXE?CAT+PASSWD
*       etc...
* =======================================================
SCRIPTS/
MSADC/
_VTI_BIN/
_MEM_BIN/
C/WINNT/SYSTEM32/CMD.EXE
D/WINNT/SYSTEM32/CMD.EXE
CGI-BIN/
```

Security Checklist for TCP/IP

- Connector Security
  - Set SECURITY=FULL (SKVCSCFG)
  - Define resource access rights (BSM/ESM)
  - Restrict remote access to specific users and IPs (SKVCSUSR)
- TCP/IP Security
  - SET SECURITY=ON in IPINIT member
  - Use Security Exit
  - Do not define users in IPINIT member

Security in a heterogeneous environment



Secure Internet access

Secure Socket Layer

Cryptography concepts

Encryption Facility

Cry

Certi

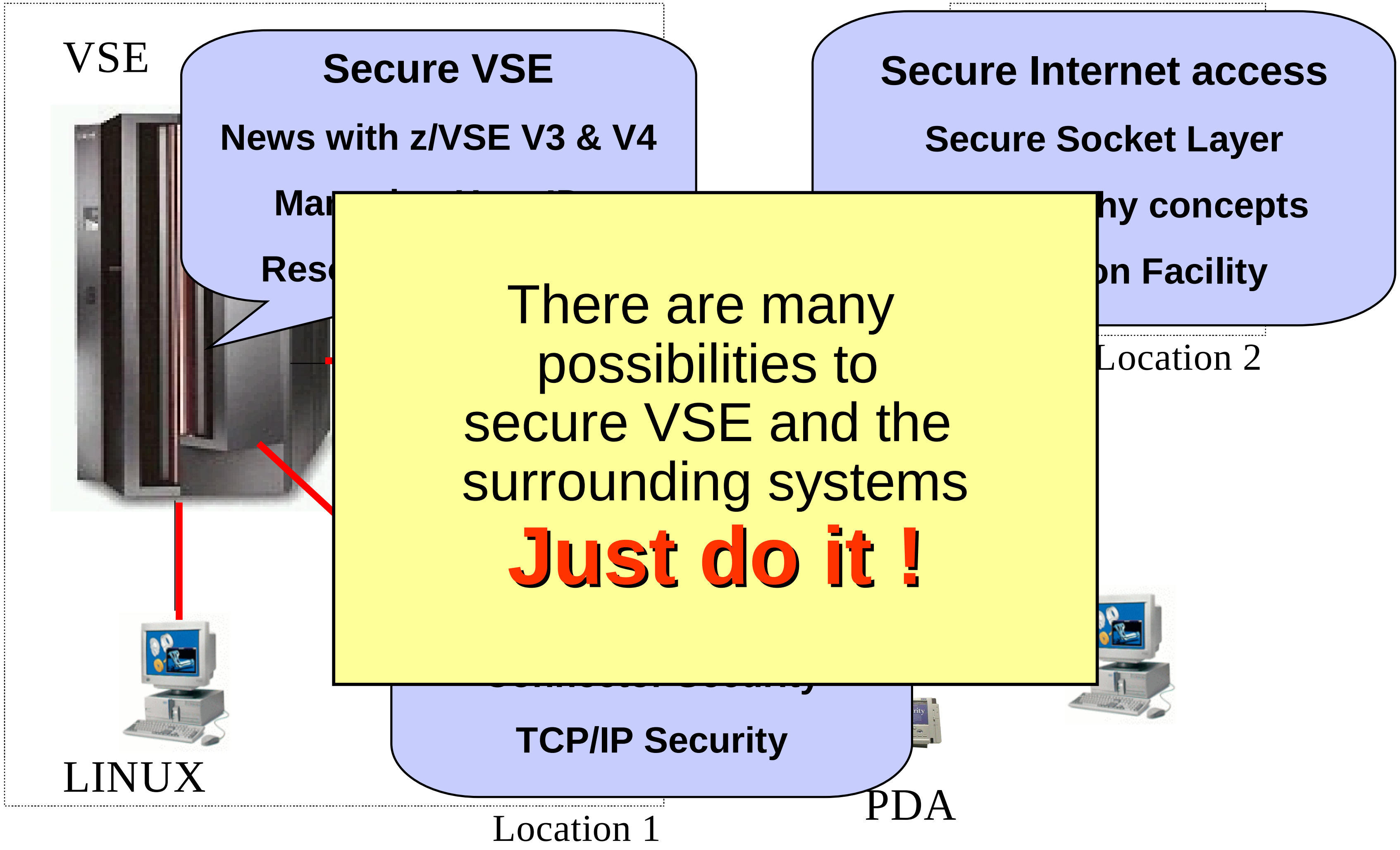
Secu Soc aye L)

Hardware Cr pto

Encryption Facility

Covered in Session
zES02 Security Exploitation
with Crypto Hardware

Security in a heterogeneous environment



There are many possibilities to secure VSE and the surrounding systems

Just do it !

Related Documentation

- IBM System z cryptography for highly secure transactions
  - http://www.ibm.com/systems/z/security/cryptography.html
- VSE Security Homepage
  - http://www.ibm.com/servers/eserver/zseries/zvse/documentation/security.html
- z/VSE Planning
- z/VSE Administration
- VSE/ESA Software Newsletter No. 17, 18 and 20
- OS/390 Security Server External Security Interface (RACROUTE) Macro Reference (GC28-1922)
- OS/390 Security Server (RACF) Data Areas (SY27-2640)
- z/VSE V4R1.0 e-business Connectors, User's Guide
- CICS Enhancements Guide, GC34-5763
- VSE/ESA 2.7.3 Release Guide, Chapter 1, section “Hardware Crypto Support”

Questions ?

?