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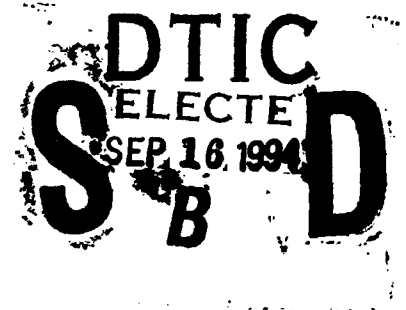


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30 September 1993

UNISYS

Library Capability Demonstration
Central Archive for Reusable Defense Software
(CARDS)

Informal Technical Data



Central Archive for Reusable Defense Software

STARS-VC-B018/001/00
30 September 1993

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INFORMAL TECHNICAL REPORT
For The
SOFTWARE TECHNOLOGY FOR ADAPTABLE, RELIABLE SYSTEMS
(STARS)

Library Capability Demonstration
Central Archive for Reusable Defense Software
(CARDS)

STARS-AC-B018/001/00
30 September 1993

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INFORMAL TECHNICAL DOCUMENT
Library Capability Demonstration
Central Archive for Reusable Defense Software
(CARDS)

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ABSTRACT

This demonstration was developed under the Central Archive for Reusable Defense Software (CARDS) Program to help facilitate advances in software reuse methods. This demonstration illustrates techniques for incorporating commercial off-the-shelf (COTS) software into the CARDS reuse library framework.

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CARDS

Library Capability Demonstration

UNAS/SALE

1 Introduction

1.1 Purpose

A major feature of the Central Archive for Reusable Defense Software (CARDS) Reuse Library Framework is the capability of CARDS Library Account Holders (LAH) to directly execute and demonstrate reusable software components from the CARDS library interface.

Included in that capability is the ability to execute commercial off-the-shelf (COTS) components as well. With that capability, specific technical challenges and legal responsibilities surface. The intent of this Library Capability Demonstration is to demonstrate and highlight the approach and implementation the CARDS Library Development Staff used to address those challenges and responsibilities.

The first commercial product that was selected to incorporate into the CARDS Reuse Library Framework was the Universal Network Architecture Services' (UNAS) CASE Tool Option — SALE (Software Architects Lifecycle Environment, hereinafter referred to as UNAS/SALE) from TRW. This tool was presented at the 26 JULY 1993 CARDS Project Management Review (PMR). The reader is encouraged to reference the UNAS presentation from that PMR for more information on UNAS and UNAS/SALE[1].

1.2 Goals

The primary goal in incorporating this capability into the CARDS Reuse Library Framework is to provide CARDS LAH the capability to execute and demonstrate UNAS/SALE from the CARDS Command Center Library interface (i.e., the RLF Graphical Browser). However, at the same time this capability should not jeopardize CARDS legal responsibilities to honor TRW's copyrights and licensing agreements which protect the UNAS product.

A second goal is to establish an extensible security framework that can be applied to other commercial products and reusable software components that contain proprietary information which are governed by copyrights and/or licensing agreements. This goal also includes testing that established framework to surface and resolve both technical and operational issues and to record lessons-learned from incorporating COTS products in the CARDS Reuse Library Framework.

2 Approach

In order to permit CARDS LAH the ability to run UNAS/SALE from the RLF Graphical Browser, technical as well as legal issues had to be resolved. Technically, the challenge was to provide the ability to run UNAS/SALE while at the same time forbidding those same users the ability

to read (and therefore copy) TRW proprietary information or in some manner execute or modify the same without proper authorization. This careful checking is necessary to uphold copyright information and licensing agreements that TRW requires of its customers.

Controlled access to UNAS/SALE will help to protect copyrights, however certain considerations are raised that are specifically related to licensing agreements. For UNAS/SALE, and the licensing agreement pending, special provisions regarding the number of users, and CPU licensing had to be considered.

In Phase II of the CARDS program, issues related to the technical and legal ramifications of incorporating commercial and proprietary information into the CARDS Reuse Libraries (specifically the Command Center Library) served as a basis for addressing the aforementioned issues[2]. Alternative approaches from the Phase II Security Demonstration were incorporated, enhanced and utilized to develop a security framework for incorporating a UNAS/SALE executable demonstration.

Additionally, during the development of that security framework, design considerations were made that would permit the extension of that security framework to other, future, COTS products that may be incorporated into CARDS Reuse Libraries.

2.1 TRW Copyrights and Licensing Agreements

Due to the unique nature of the CARDS Program and CARDS Reuse Libraries, it was necessary to contact TRW directly and communicate our intentions to put UNAS/SALE into the Command Center Library and discuss the implications that doing so would entail. CARDS wanted concurrence that TRW understood that authorized users of the Command Center Library (earlier defined as Library Account Holders) would have the ability to run UNAS/SALE in a controlled environment and that execution would occur from only hosts licensed by TRW.

From that conversation, TRW's concerns were noted that:

1. all copyrights and licensing agreements would continue to be honored;
2. CARDS would, in an official capacity, sign TRW licensing agreements;
3. and CARDS could insure that Library Account Holders would be unable to extract the software from the library.

Therefore, caveated with TRW concerns, they concurred with our intent. Additionally their concerns and licensing agreements specifically scoped our goals and approach to incorporate UNAS/SALE into the CARDS Command Center Library.

Generally copyright laws govern rules for copying, handling and modification of software. Our approach was to protect TRW copyrights by controlling access to UNAS/SALE in such a manner that LAH would be unable to copy or extract the UNAS/SALE CASE Tool or other proprietary information from the CARDS library interface or other means without specific and auditable authorization.

TRW Licensing agreements for UNAS and UNAS/SALE are designed to govern access or execution to the tools themselves. These licensing agreements only specify host or CPU

identification and do not govern execution at the user level (either by the number of users or by a specific user).

Both UNAS and UNAS/SALE are licensed to run on CARDS main server, `dealer.cards.com`. UNAS/SALE is also licensed to run on `solitaire.cards.com`. However, only UNAS performs license management to insure that it is indeed running on it's licensed host. UNAS/SALE, although bound by licensing agreement, does not perform license management to enforce that agreement. Therefore our approach to protect the UNAS/SALE agreement was to develop a license management capability to "wrap" the execution of UNAS/SALE and enforce the agreement that would permit its execution on hosts for which it had been licensed.

2.2 User Interaction

As presented in the 26 JULY 93 CARDS PMR, UNAS/SALE was to be incorporated into the Command Center Library which entailed:

1. providing a description of UNAS and UNAS/SALE from the library interface;
2. providing contact information where the LAH can obtain more information about UNAS and UNAS/SALE;
3. enabling execution of UNAS/SALE from the library interface by the LAH.

As straightforward as these requirements may seem at first, many issues regarding those mentioned above (pertaining to copyrights and licensing agreements) had to be addressed. Of additional concern, was the "intuitiveness" and "user-friendliness" of UNAS/SALE from the perspective of the LAH who may or may not have the necessary background or material on-hand to operate the tool as intended by the commercial vendor. Our approach for making UNAS/SALE accessible to the LAH was to provide a clean interface for launching the CASE Tool and to provide as much information as necessary to the LAH in order to assist them in operating the tool at a fundamental level.

Since the goal was to incorporate UNAS and UNAS/SALE into the Command Center Library as quickly as possible, no effort was undertaken to "qualify" UNAS or UNAS/SALE as a qualified command center component. However, components in the Command Center Library must be modeled in the context of other components in the library model, therefore our approach was to depict UNAS/SALE as a specialization of the Command Center concept "CASE_tool", which represents tools which can be used to support the lifecycle development of command centers. At the moment, Software Thru Pictures, which is also modeled¹ as a specialization of the concept "CASE_tool", is a CASE Tool by which users can develop application via a graphical user interface. UNAS/SALE was a natural fit as a peer to Software Thru Pictures as a CASE Tool.

¹ Software Thru Pictures, although modeled is *not* executable from the Command Center Library interface.

2.3 Applicable portions from Phase II Security Demonstration

From the CARDS Command Center Library Security Demonstration, Phase II, CARDS established a security policy that is governed by the library's operation and places specific requirements on implementations that carry out those operational concepts. Related to the activity of incorporating a commercial product, such as UNAS/SALE, into the Command Center Library, the following security policies were deemed relevant to this effort:

1. protecting the integrity of library components;
2. protecting the licensing and distribution of COTS;
3. and limiting the access to authorized users.

Therefore concepts and elements that were discussed and demonstrated during that period were used and extended in our approach.

2.3.1 Unauthorized Modification

Our approach to insure against unauthorized modification was to store UNAS and UNAS/SALE into an AFS volume that is not privileged to LAH. Non-staff and non-staff affiliates do not have read or write access to any UNAS or UNAS/SALE proprietary information stored in this volume. Additionally, this volume will be established as a read-only AFS volume to protect against accidental modification. Other technology such as encryption or digital signatures will be used in the future once that technology becomes available to the CARDS Reuse Library Framework.

2.3.2 Unauthorized Extraction

Through the CARDS Command Center Library interface, the library administration team can control what files are available for extraction and distribution, therefore only description file(s) for UNAS and UNAS/SALE were made available for extraction. The steps taken to insure against unauthorized modification were helpful to also insure against unauthorized extraction as the AFS ACL (Access Control Lists) prohibit non-staff and non-staff affiliates from reading (hence copying) data from that AFS volume. Further, since the files are unreadable by those users, proprietary data cannot reach a remote LAH hosts, where the AFS cache could potentially be compromised.

It is important to point out that an authorized CARDS staff user at a remote AFS site could cause, potentially proprietary, data to be cached at that site, in which that data then could be extracted from their cache. However, the risk of this event occurring has been noted and has been accepted for the time being.

2.3.3 Unauthorized Execution

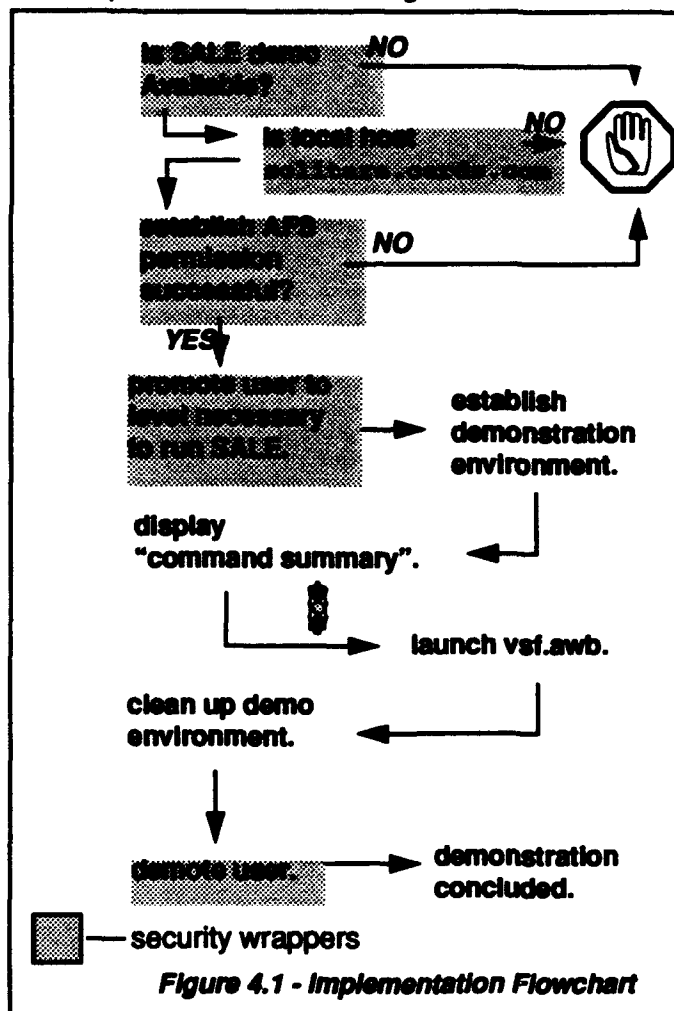
To insure that unaudited and unauthorized execution of UNAS or UNAS/SALE by LAH does not occur, UNAS and UNAS/SALE have been "wrapped" by security wrappers which only permit controlled execution of UNAS/SALE. Since such stringent access control has been

placed on the product, the wrappers were necessary to enforce controlled, audited access to UNAS/SALE executables, configuration files and data files. Additionally, these wrappers enforce execution and access as defined in the licensing agreement — in this case execution from the host `solitaire.cards.com`.

This type of access control does have a positive side effect: execution from any other host is not possible and data (potentially proprietary) that could possibly reach a remote host's AFS cache is prevented, thus avoiding the potential of an AFS cache attack.

3 Implementation

The attached appendix details many of the additions and modifications to the CARDS Command Center Library version 3.1 which were necessary to incorporate and include UNAS and UNAS/SALE into the Command Center Library as well as how to launch the product. The figure below depicts the steps involved in launching UNAS/SALE.



When the LAH identifies their intent to run the demo from the RLF Graphical Browser, the CARDS developed security wrappers (identified in grey-scale in Figure 4.1) are executed to check for authorization and establish necessary permissions to allow controlled execution of

the UNAS/SALE CASE Tool. In the event that authorization is not granted the execution of the tool is stopped and the user informed. In the event that authorization is granted the environment necessary to execute UNAS/SALE is established and the user is provided a "command summary" which identifies basic commands and steps necessary for the LAH to successfully navigate and exit UNAS/SALE. Upon completion the environment is removed, permissions restored to those before the execution of UNAS/SALE and the demonstration concluded.

The security wrappers developed to incorporate UNAS/SALE into the Command Center Library are a combination of Bourne Shell scripts and executable programs that utilize AFS ACLs and normal UNIX ownership privileges. The UNAS/SALE demonstration scripts that are wrapped by the security wrappers are owned by a pseudo-user known as "unasdemo". This pseudo-user has the necessary, minimal permissions to execute UNAS/SALE successfully from `solitaire.cards.com`. The security wrappers are responsible for:

1. establishing the fact that UNAS/SALE is demonstrable from within the Command Center Library;
2. the host from which UNAS/SALE is to be executed is indeed `solitaire.cards.com`;
3. and that AFS permissions for "unasdemo" exist and are active for UNAS/SALE to be successfully executed.

If any one of the above criteria are not met the demonstration is concluded prematurely.

The security wrappers are installed with their permission mask set to effectively promote the user running the wrappers to be elevated to that of the owner, which in this case is "unasdemo". This is known in UNIX terminology as the "setuid" bit. Setting this bit causes the UNIX operating system to set the "effective" user id to that of the owner of the executable shell script. From that point on, until the executing script is terminated the user, which is the LAH, is running as if they had the same permissions as that of "unasdemo". Therefore once the LAH exits UNAS/SALE, their "effective" user id reverts to that which it was before the security wrappers were launched — thus "demoting" the LAH.

One additional bit of implementation details: the executable programs that obtain the proper AFS permissions to run UNAS/SALE are not in an AFS, but in an NFS filesystem which is only attached to `solitaire.cards.com`. This was done to avoid the potential for a remote AFS cell to obtain the necessary data in the remote AFS cache which could be used to grant AFS authorization for "unasdemo". Therefore this combination of AFS ACL and NFS (or a local UNIX filesystem) appear to be an effective mechanism for protecting critical data like encryption keys and password — which if left to AFS could be compromised via an AFS cache attack. Also, one pleasant side-effect is that by utilizing NFS or a local UNIX filesystem, this insures that the LAH is actually on the host that has that NFS filesystem mounted or actually owns the physical disk partition in which that UNIX filesystem exists. Without those critical files, execution of UNAS/SALE via the security wrappers is not possible.

4 Accomplishments

CARDS has been able to provide the capability to execute and demonstrate UNAS/SALE from the Command Center Library interface with the constraints and requirements mandated:

1. that all copyrights and licensing agreements would continue to be honored;
2. CARDS could insure that Library Account Holders would be unable to extract the software from the library¹;
3. to provide a description of UNAS and UNAS/SALE from the library interface;
4. to provide contact information where the LAH can obtain more information about UNAS and UNAS/SALE;
5. to enable execution of UNAS/SALE from the library interface by the LAH;
6. to protect the integrity of library components;
7. to protect the licensing and distribution of COTS;
8. and to limit the access to authorized users.

Further, the design and implementation of the surrounding security framework has provided CARDS with an extensible framework that can be tailored and extended to other commercial products as CARDS moves to incorporate other COTS components, qualified or unqualified, into CARDS Reuse Libraries.

5 Issues

The underlying intent was to make the UNAS/SALE demonstration operational by 4th Quarter 1993. That has been put on hold until the licensing agreement between CARDS and TRW is fully signed and executed by all parties.

Some outstanding issues still remain regarding AFS. It was learned during this effort that it is possible for an application to misinterpret permission masks on files as they reside in AFS. At the moment it has not been concluded as to whether this is a symptom of a problem in AFS or a flaw in the UNAS/SALE product itself. Work is still underway to resolve that problem. However, that does not impact our implementation.

As mentioned earlier, the *"intuitiveness"* and *"user-friendliness"* of UNAS/SALE itself as a CASE Tool is still an issue. CARDS is looking into alternative mechanisms to better demonstrate UNAS/SALE. Some of the tabled ideas are:

1. On-line tutorials — which go into more depth than the current "command summary" that is displayed to the LAH. Such a tutorial would walk the LAH through an entire session of UNAS/SALE;
2. Screen playback tools — which would take over the LAH display and automatically run the LAH through a session with UNAS/SALE;

¹. Except, as noted earlier, via the AFS cache. However, the current number of AFS users with appropriate privileges is sufficiently small that the risk is, at this time, relatively low.

3. Additional training — which would be provided to CARDS Library Staff and Hotline personnel to handle in-depth questions generated from LAH who utilize UNAS/SALE.

APPENDIX A

This section outlines the required changes to the Command Center Library model (depicted in RLF Library Model Description Language — LMDL). Changes below reflect the context differences between LMDL version 1.6 and LMDL version 1.8 of the Command Center model which was used to build Command Center Library Version 3.1.

```
=====
RCS file: RCS/command_center.lmdl,v
retrieving revision 1.6
retrieving revision 1.8
diff -c -r1.6 -r1.8
*** 1.6 1993/07/14 14:45:02
--- 1.8 1993/08/02 15:16:29
*****
*** 1,5 ****
! -- $Revision: 1.6 $
! -- $Id: command_center.lmdl,v 1.6 1993/07/14 14:45:02 saus Exp $
--
-- Model Description: This model is a representation of Command Center
-- software and related subsystems.
--- 1,5 ----
! -- $Revision: 1.8 $
! -- $Id: command_center.lmdl,v 1.8 1993/08/02 15:16:29 mccutch Exp $
--
-- Model Description: This model is a representation of Command Center
-- software and related subsystems.
*****
*** 1899,1904 ****
--- 1899,1914 ----
file Description is "command_center/text/case_software_desc.txt";
end attributes;
end category;

+
+ object UNAS_SALE (CASE_tool) is
+ attributes
+ file Description is "command_center/text/unas_sale_desc.txt";
+ file demo is "command_center/components/unas_sale/src/sale_demo";
+ end attributes;
+ actions
+ Run is Run_Demo_Action on demo;
+ end actions;
+ end object;

category CASE_tool ( CASE_software ) is
attributes
```

APPENDIX B

This section identifies all the files for this version of the Command Center Library that were either added, deleted or modified for this release of the library.

1 Added

Those files added to the Command Center Library version 3.1:

```
$RLF_LIBRARIES/Text/command_center/demos/unas_sale/src/demo_script
$RLF_LIBRARIES/Text/command_center/demos/unas_sale/src/sale_command_summa
ry.txt
$RLF_LIBRARIES/Text/command_center/demos/unas_sale/src/sale_demo
$RLF_LIBRARIES/Text/command_center/demos/unas_sale/text/unas_sale_desc.tx
t
$RLF_LIBRARIES/Text/command_center/demos/unas_sale/contents
$RLF_LIBRARIES/Text/command_center/demos/unas_sale
#RLF_LIBRARIES/Text/command_center/demos/unas_sale/src/demo_can_be_run_on
_sol.txt
```

Those files added to the CARDS Reuse Library infrastructure:

```
/home/solitaire/unasdemo/KLOG/klog_unas
/home/solitaire/unasdemo/KLOG/UNAS_KLOG/unas_klog
/afs/cards.com/user/unasdemo/*
```

2 Modified

Those files modified as a result of adding UNAS/SALE to the Command Center Library version 3.1:

```
/afs/cards/staff/libdev/src/gcc/models/command_center/lmdl/command_center
.lmdl
```

APPENDIX C

This section describes the steps necessary to reproduce the demonstration. This is in fact the demonstration script.

1 Notational Conventions

This section uses the following notational conventions

1. *italic face* is used for:
 - a variable
 - a command argument
2. Courier font, plain face is used for:
 - a listing
 - a command name
 - a program name
 - output, as shown in an example
3. **bold face** is used for:
 - user input, as shown in an example

2 Demonstration Scenario

Before logging into *solitaire* at *cards.com*, assure that your X Display server will permit a connection from clients from *solitaire.cards.com*:

```
xhost +solitaire.cards.com
```

Logon to *solitaire* and obtain an AFS token to permit you to run the Command Center Library version 3.1

```
rlogin solitaire.cards.com
Password: <password>
klog
AFS Password: <AFS_password>
```

Before running the RLF Graphical Browser via the CARDS Command Center Library startup shell script, identify your home host display device via the *DISPLAY* environment variable.

```
setenv DISPLAY <home_host>:0.0
```

for example:

```
setenv DISPLAY golf.cards.com:0.0
```

To enable execution of the UNAS/SALE product from the Command Center Library, you must reconfigure the startup shell script, this can be done via:

```
cp $LIBBIN/rungb <writeable-directory>/myrungb
cd <writeable-directory>
```

for example:

```
cp /afs/cards/staff/baseline/Library/bin/rungb \
~/myrungb
cd ~
```

Modify the section of code in the new startup shell script that looks like:

```
#####
# This is the demo area. This will
# set the proper environment variables
#####

# uncomment this if the SALE demo does not exists
RUN_SALE_DEMO=""; export RUN_SALE_DEMO
# uncomment this if the SALE demo does exists
#RUN_SALE_DEMO=EXISTS; export RUN_SALE_DEMO
```

to read as:

```
#####
# This is the demo area. This will
# set the proper environment variables
#####

# uncomment this if the SALE demo does not exists
#RUN_SALE_DEMO=""; export RUN_SALE_DEMO
# uncomment this if the SALE demo does exists
RUN_SALE_DEMO=EXISTS; export RUN_SALE_DEMO
```

Now execute the modified shell script to bring up the RLF Graphical Browser on the Command Center Library version 3.1:

```
<writeable-directory>/myrungb
```

for example:

```
~/myrungb
```

After a few moments, select "CARDS CCL" from the CARDS Command Center Library launch window. Wait a few minutes while the RLF Graphical Browser loads and displays the CARDS Command Center Library.

From the Graphical Browser, select the "Search" button from the main menu bar and enter "UNAS", and press the button labeled "OK". From that dialogue, you will be presented with a Search List Selection dialogue box, presenting all the concepts and nodes in the model which

have the string "UNAS" as part of their name. From that Search List, select "UNAS_SALE" and press the "APPLY" button.

This will automatically navigate the RLF Graphical Browser to that concept in the Command Center Library. At this point your display will be centered on the "UNAS_SALE" concept in the Command Center Library.

Command Center Library Account Holders may obtain more information regarding UNAS/SALE by selecting the node menu of the Object "UNAS_SALE". From that menu the Library Account Holder can either obtain a short description of UNAS/SALE or actually run UNAS/SALE as a demonstration of the capabilities and user interface of the product.

From the node menu, select "Perform Action", and from the submenu, either select "Provide Description" or "Run demo". By selecting "Provide Description" the user is presented with a short description of the UNAS product line as well as the UNAS/SALE CASE Tool, which can be executed from the Command Center Library interface. Selecting "Run demo", the Library Account Holder will be launched in to a running version of the commercial product.

Additionally, as a result of selecting "Run demo", a short command summary is presented to the Library Account Holder to assist in the basic command necessary to effectively navigate the CASE Tool.

APPENDIX D

Library Capability Demonstration PMR slides presented 29 September 1993.

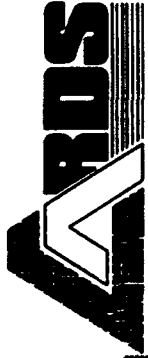


**Central Archive for Reusable
Defense Software
(CARDS)**

Library Capability Demonstration
TASK: UA48
CDRL: B018
STARS-AC-B018/001/00

30 September 1993

**Scott A. Hissam
Unisys Corporation**



Presentation Overview

- **Goal**
- **Approach**
- **Implementation**
- **Accomplishments/Issues**
- **Live Demonstration**

Goal

- **Primary**
 - **Provide the capability to execute and demonstrate UNAS's CASE Tool Option, SALE, in a manner that would not jeopardize CARDS legal responsibilities to protect UNAS copyrights and licensing agreements.**
- **Secondary**
 - **Establish a security framework that is extensible to other commercial products as they are incorporated into CARDS Reuse Libraries.**
 - **Surface and resolve out operational issues and record lessons-learned from the incorporation of UNAS/SALE into the CARDS Command Center Library.**



Approach

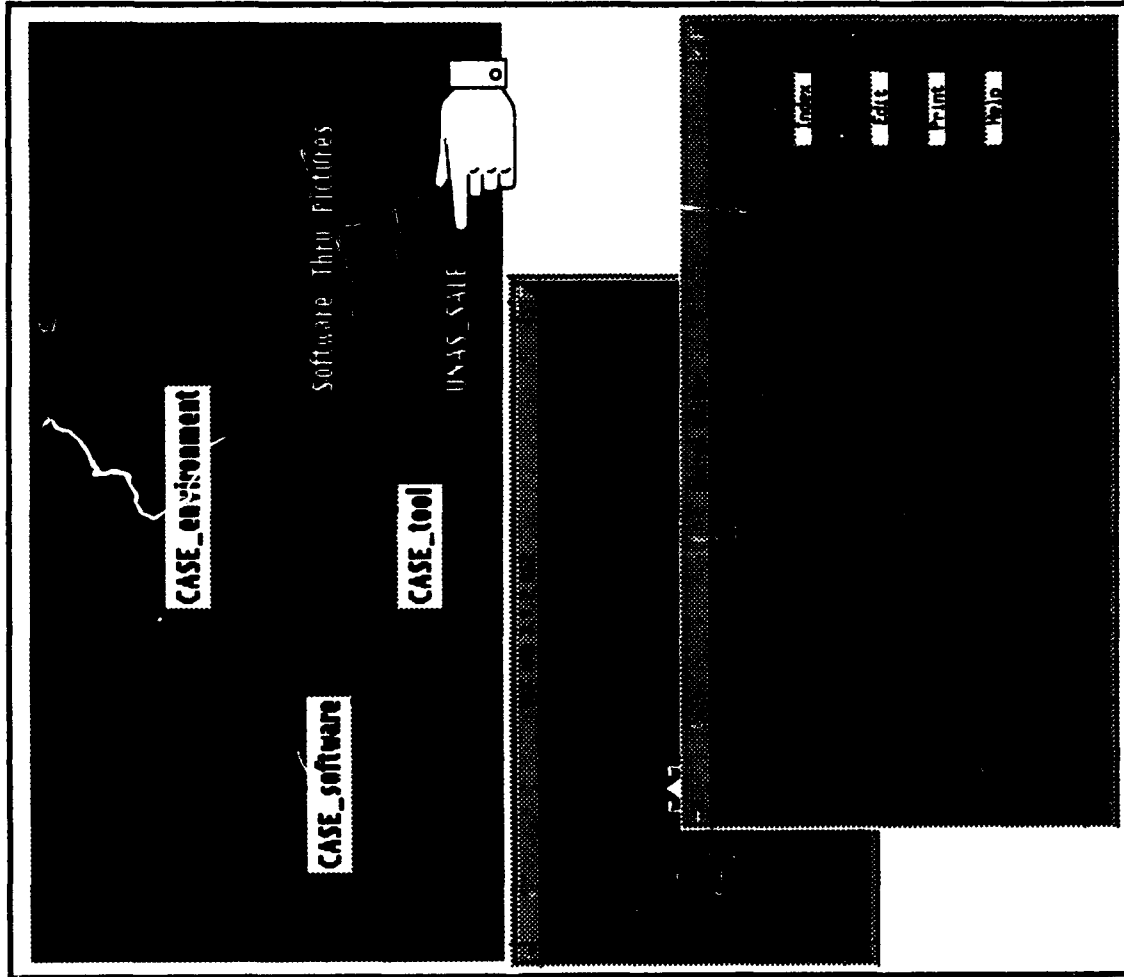
- **Execute necessary licensing agreement(s) with TRW.**
- **Provide the CARDS Command Center Library user with the ability to execute UNAS/SALE from the RLF Graphical Browser.**
- **Draw on the security demonstration from Phase II by incorporating and enhancing the basic recommendations from that initial work.**
- **Maintain an extensible design that will protect copyright and licensing agreements for commercial products which enforces stated CARDS policies regarding unauthorized modification, extraction and execution.**



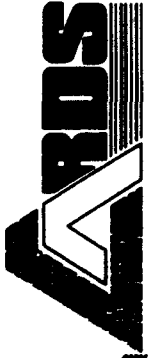
TRW Copyrights and Licensing Agreements

- TRW was contacted as to the nature of our intent to include UNAS/SALE into the CARDS Command Center Library
 - General consensus was positive, caveated by adherence to all copyrights and licensing agreements in hand.
 - Not formally written.
- The licensing agreement is, at the moment, un-executed. CARDS Command Center Library capability to demonstrate UNAS/SALE will go operational once this agreement is signed.
- SALE is bound by per/host, or per/CPU license
 - SALE is licensed to run on either solitaire.cards.com or dealer.cards.com.
 - SALE, itself, does not enforce this licensing agreement — therefore it is CARDS responsibility to enforce that agreement.
- UNAS is bound by per/host, or per/CPU license
 - UNAS is licensed to run on dealer.cards.com.
 - UNAS, itself, does enforce this licensing agreement.

User Interaction



- Modeled as a peer to Software Thru Pictures as a CASE Tool:
 - tools which can be used to support the development of command centers;
 - unqualified as a Command Center Library component.
- Description File:
 - What UNAS and SALE are;
 - Whom to contact at TRW for more information.
- Demonstrable Component:
 - User "command summary" provided;
 - Executes UNAS/SALE only.
- Assumes:
 - User has no prior knowledge of UNAS or UNAS/SALE.



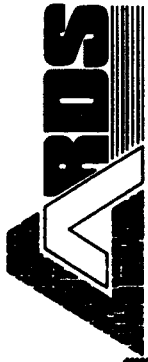
Applicable portions from Phase II Security Demo

- Policy issues that apply:
 - protects the integrity of library components;
 - protects the licensing and distribution of COTS;
 - and limits access to authorized users.
- Concepts and elements that were demonstrated during that period were used and extended for this implementation.

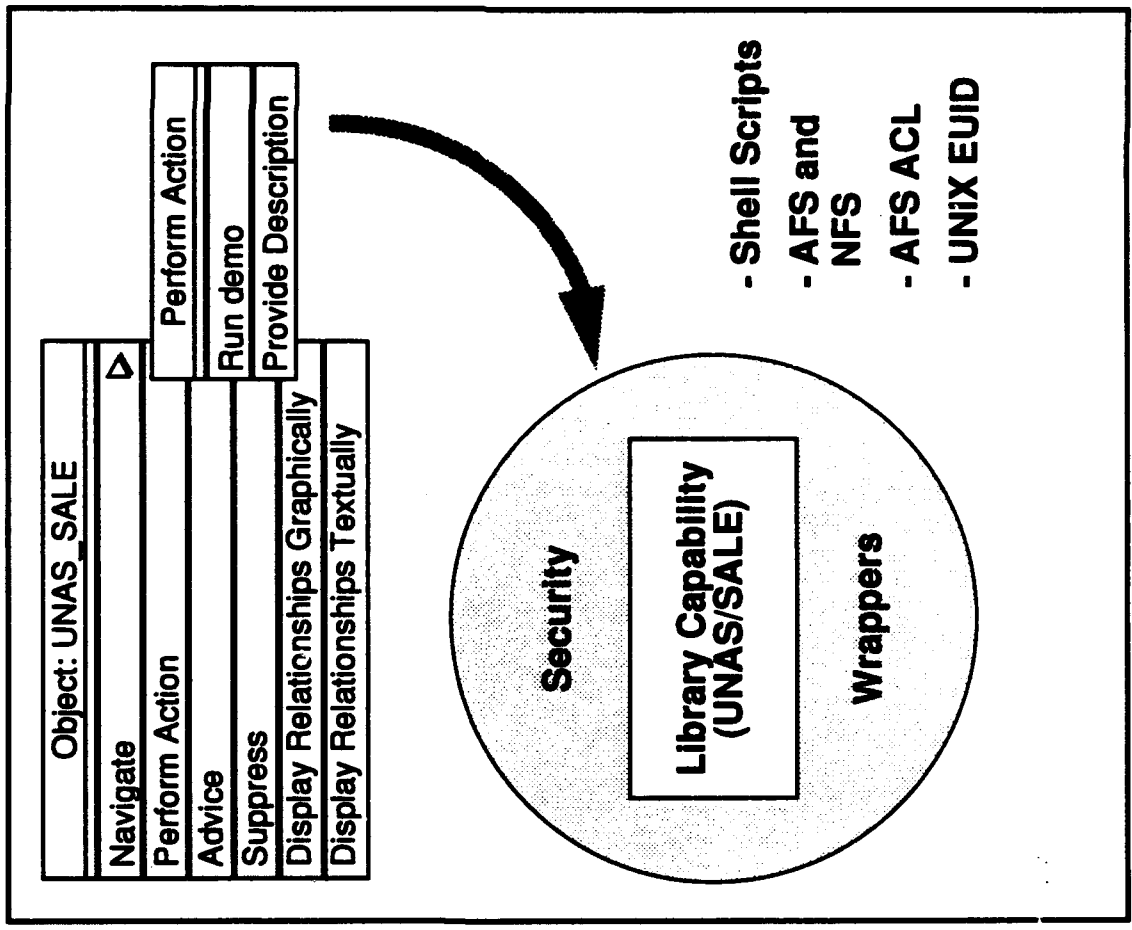
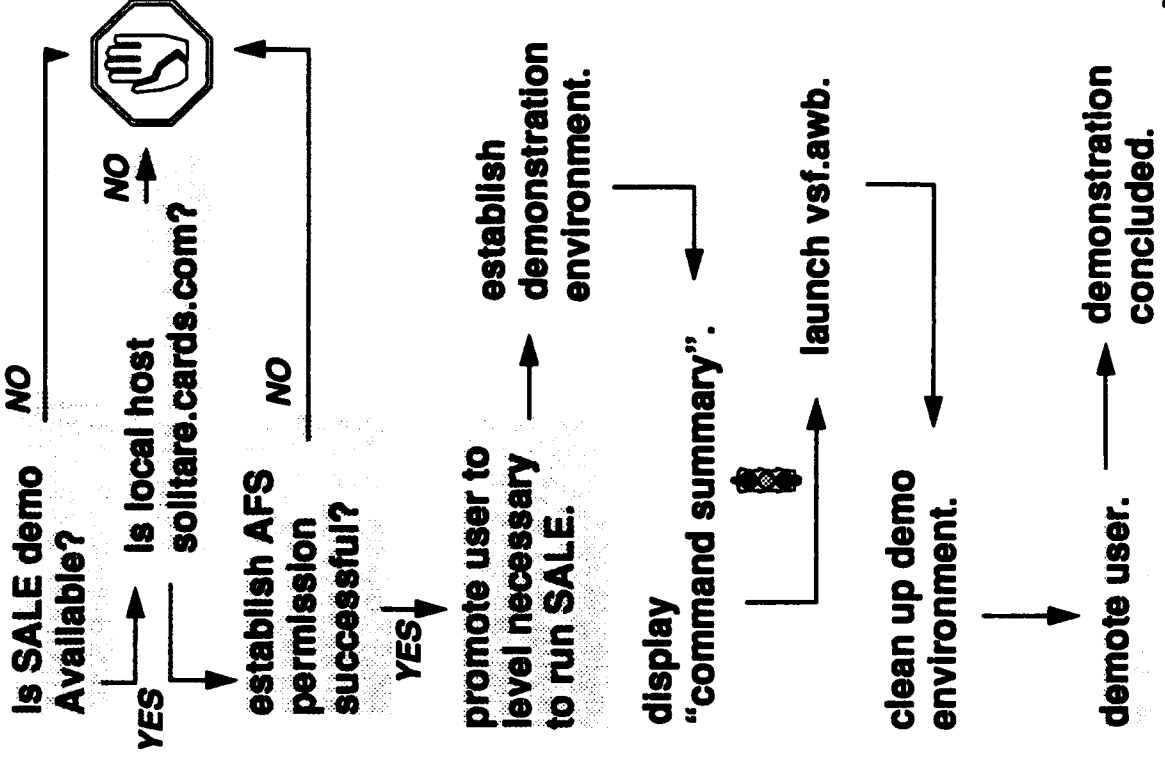


Policy Concerns Addressed

- **Unauthorized Modification**
 - UNAS and UNAS/SALE are located in the CARDS staff volume which is not privileged to CARDS Library Account Holders.
 - Non-staff and Non-staff affiliates do not have read (or write) access to any UNAS or UNAS/SALE proprietary information.
- **Unauthorized Extraction**
 - Only description files for UNAS and UNAS/SALE are available for extraction.
 - Files are unavailable to non-staff and non-staff affiliate account holders.
 - AFS ACL protection prevents data from reaching a remote cells AFS cache.
- **Unauthorized Execution**
 - Implemented security framework only permits execution of UNAS/SALE through CARDS developed wrappers.
 - Wrappers enforce controlled access to UNAS/SALE's executables, configuration files and data files.
 - Wrappers enforce execution availability from solitaire.cards.com, hence UNAS/SALE is never executed by remote sites and thus remote AFS cache will not contain proprietary information.



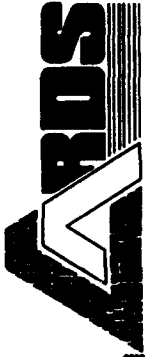
Implementation





Accomplishments

- **Provided the capability to execute and demonstrate UNAS/SALE from the RLF Graphical Browser with the aforementioned caveats.**
- **Established framework for incorporating the UNAS/SALE demonstration which is extensible to other commercial products.**
- **Established the prevention of unauthorized modification, extraction and execution of library installed commercial products.**
- **Lessons-learned still being gathered.**



Issues

- **Licensing agreement still outstanding, library release to include UNAS/SALE demonstration pending.**
- **AFS is not as transparent to UNIX and POSIX compliant applications as initially thought, need to address each COTS component on a case-by-case basis may be necessary.**
- **Intuitiveness of UNAS/SALE and a CASE Tool, tabled ideas:**
 - **On-line tutorials;**
 - **Screen playback tools;**
 - **Additional training.**

REFERENCES

- [1] "CARDS UNAS Activities", Briefing presented at the CARDS Project Management Review, 26 JULY 1993, Fairmont WV.
- [2] "CARDS Command Center Library Security Demonstration", Informal Technical Data, STARS-AC-04106/001/00, 26 August 1993