

SysWorks

Introduction

A Tutorial on Using SysWorks

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Part I

Concepts

Introduction

SysWorks provides:

- **Enhanced DECwindows/Motif integration for users and application developers.**
- **Application development tools including building utilities and version management.**
- **System management tools including user management, configuration management and system startup and shutdown facilities.**

Installation Level

SysWorks may be installed at the following levels:

- **Public**
Access to functions via users personal username.
- **System**
Access to non-privileged functions via personal username. Access to privileged functions via servers.
- **Turnkey**
Access to functions the same as for a system installation. Replaces all site-specific OpenVMS command procedures so that SysWorks controls all system management functions.

Documentation

SysWorks provides the integrated documentation in the following formats:

- **Bookreader**
- **Printable PostScript**
- **Online help**
- **Hypertext (HTML)**

This documentation is produced using DECdocument, which produces output from a single set of sources ensuring complete consistency between each format.

Search Lists

OpenVMS supports the concept of a search list with the following behaviour:

- **Read and update access to an object looks through each entry in the search list until the object is found**
- **Creation is performed in the first entry of the search list**

Some objects which form search lists include:

- **Nodes, devices, directories and files**
- **Logical name tables**
- **CDD/Repository dictionaries**
- **CMS libraries; CMS class search lists are a SysWorks extension**

Some SysWorks uses of search lists include:

- **Variant application development environments.**
- **Developer specific development environments.**

Logical Name Tables

- **OpenVMS uses a search list of logical name tables as follows:**
 - LN\$PROCESS**
 - LN\$JOB**
 - LN\$GROUP**
 - LN\$SYSTEM**
- **DECwindows/Motif adds the DECW\$LOGICAL_NAMES table after the LN\$SYSTEM table.**
- **SysWorks enhances this by extending the list to:**
 - LN\$PROCESS**
 - LN\$JOB**
 - LN\$USER**
 - LN\$CONTEXT**
 - LN\$GROUP**
 - LN\$SYSTEM**
 - DECW\$LOGICAL_NAMES**
- **Furthermore, LN\$CONTEXT can also be a search list of the chained contexts.**

Logical Name Tables (cont)

- The logical name of the logical name table search list is `LN$FILE_DEV`. This logical name is defined in the `LN$DIRECTORIES` search list.
- The names in the `LN$FILE_DEV` search list may be logical names which have an equivalence of the actual logical name tables.
- The `LN$USER` logical name table is a system wide logical name table which is generally populated the first time that a user logs into a node.
- The `LN$CONTEXT` logical name table is switched to the appropriate application environment or group logical name table when the `CONTEXT` command is issued.
- When a user is in their home environment, no `LN$CONTEXT` logical name table is used.

SysWorks Directories

- **SWRK_DAT_DIR**
Location of data files and generated command procedures.
- **SWRK_DOC_DIR**
Location of bookreader, help and PostScript and documentation.
- **SWRK_LCL_DIR**
Location of site specific command procedures.
- **SWRK_SFT_DIR**
Location of software.

System User Classes

- In system and turnkey installations:
 - + An identifier of the form *S_system-user-class* is used as security
 - + User management places users in one or more system users classes
 - + Privileges and/or quotas may be associated with system users classes
- In public installations, they may be defined in `SWRK_LCL_DIR:SWRK_ALTERNATIVE_IDENTIFIERS.DAT`
- Each system user class has a directory in `SWRK_DAT_ROOT:`
- A site specific directory may be created in `SWRK_LCL_ROOT:`

System User Classes (cont)

The following standard pre-defined System User Classes exist:

| System User Class | Usage |
|--------------------|---|
| ACMS | ACMS user - provides access to ACMS. |
| ALL | All users - provides base level functions for all users. |
| ALLIN1 | All-In-1 user - provides access to All-In-1. |
| APPLICATION | Applications - provides base level functions for all applications. |
| BASE | Automatically granted to provide basic OpenVMS authorization details. |
| CAPTIVE | Captive users - provides reduced base level functions for captive users. |
| DBA | Database Administrator - allows a users to use the SysWorks database administration features. |
| DCL | DCL user - allows a user access to DCL. Note that this system user class is only necessary when the USER system user class does not allow access to DCL by default. |
| DEVELOPER | Allows a users to use the SysWorks development features. |
| GROUP | Groups - provides base level functions for all groups. |
| OPERATOR | Operator - almost full read access and limited read/write access to all information. |
| PATHWORKS | Pathworks user - provides access to Pathworks including LAN Manager, PCSA and Macintosh variants. |
| PRINTER_CONTROLLER | Printer controller - may start and stop print queues and print jobs. |
| SYSTEM_MANAGER | System manager - full read/write access to all information. |
| USER | User recognized by SysWorks - All users should be a member of this system user class - the exception being Digital and other third party product usernames. |

SysWorks Tutorial

| System User Class | Usage |
|-----------------------|--|
| USER_REGISTRAR | User registrar - may add, create, delete and remove users from clusters and the security domain. Note that although a user registrar may register any user, they may only grant access to system user classes which they are a member of. Thus only members of the SYSTEM_MANAGER system user class may register other system managers. The exception to this rule is that a member of the SYSTEM_MANAGER system user class is an implicit member of all system user classes, so they can grant a user access to any system user class. |

Part II

User Environment

Logging In

Login command procedures

- **SYS\$MANAGER:SYLOGIN.COM**
- **SYS\$LOGIN:LOGIN.COM**
- **SYS\$MANAGER:DECW\$SYLOGIN.COM**
- **SYS\$LOGIN:DECW\$LOGIN.COM**

Other details

- **SysWorks SYLOGIN.COM** should be executed in **SYS\$MANAGER:SYLOGIN.COM** or **SYS\$LOGIN:LOGIN.COM**
- In **DECwindows/Motif**, the entire session is logged in:

`SYS$LOGIN:DECW$SM.LOG`

- In **PATHWORKS DECwindows** (or **eXcursion**), the entire session is logged in:

`SYS$LOGIN:NETSERVER.LOG`

SysWorks Login Actions

- Determine exact process mode and variant.
- Define various symbols including:
 - CMD_DEVICE
 - CMD_GUESSED
 - CMD_MOTIF
 - CMD_NODE
 - CMD_SM
 - CMD_TERMINAL
 - CMD_TYPE
 - CMD_VT300
 - CMD_WINDOW
- Create a user logical name table if not already present. If possible, this is made a permanent system table.
- Populate user logical name table if not populated. The logical name *username_STATE* with a value of AVAIABLE indicates this.
- Move to saved or default environment.

Process Modes

- **Batch**
- **Interactive**
Terminal Devices include LT, TT, TX and VT
Window Terminal Devices include FT and TW
Window Devices include MB and WS)
- **Other (Detached)**
- **Network**
MX\$SERVER and PCX\$SERVER similar to an interactive window

CMD_xxxx Symbols

- **CMD_DEVICE**
- **CMD_GUESSED**
- **CMD_MOTIF**
- **CMD_NODE**
When **CMD_WINDOW** is true, this symbol contains the name of the node to which we are being displayed)
- **CMD_SM**
- **CMD_TERMINAL**
SET TERMINAL commands should only be executed if this symbol is true
- **CMD_TYPE**
If **CMD_TERMINAL** is true, this is set to a value such as **VT300**
- **CMD_VT300**
- **CMD_WINDOW**

User Directories

All these sub-directories are of the form:

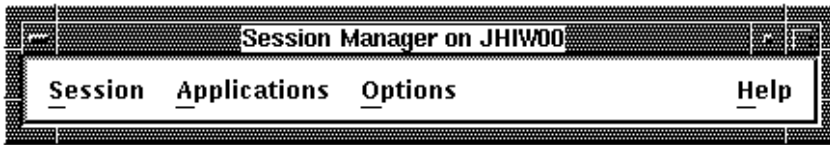
DISK_USER: [*username.sub-dir*]

Table 1: User Directory Usage

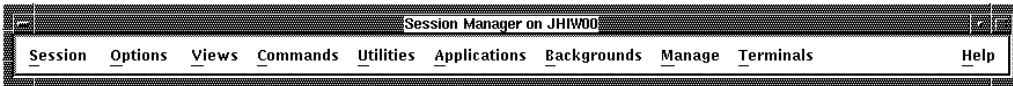
| Directory | Code | Usage |
|---------------------------|-----------------------------|---|
| DECwindows | DECW | Used instead of SYS\$LOGIN: for DECW\$USER_DEFAULTS. |
| | DECW.DENSITY_ <i>dpi</i> | Used before the [.DECW] sub-directory for DECW\$USER_DEFAULTS for a display of the indicated density. Typical <i>dpi</i> values include 75 and 100. |
| | DECW.VAX_ <i>type</i> | Used before the [.DECW] and [.DECW.DENSITY_ <i>dpi</i>] sub-directories for DECW\$USER_DEFAULTS for a VAXstation of the indicated type. |
| DECwindows Application | DECW. <i>dwapplcod</i> | Used before the above directories for DECW\$USER_DEFAULTS for the indicated DECwindows/Motif application. |
| All-In-1 | A1 | Used as the users All-In-1 directory. |
| Mail | MAIL | Use as the users OpenVMS Mail and DEC MAILworks directory. |
| Data | DAT | Used instead of SYS\$LOGIN: for user data files and generated DCL command procedures such as SWRK_DECW_LOGICALS_ <i>node</i> .SBC. |
| Software | SFT | Used instead of SYS\$LOGIN: for user software such as DCL command procedures such as HOME.COM and LOGICALS.COM. |

Session Manager

DECwindows/Motif default Session Manager menu bar



SysWorks extended Session Manager menu bar



How This Happens

- **Session Manager**
- **FileView**
- **Resource Files**
Used by all Xwindow applications.
- **Profile Files**
Used by the Session Manager / FileView
- **DECW\$USER_DEFAULTS**
Search list of [.DECW] sub-directory, or if not present, SYS\$LOGIN: followed by SWRK_VUE_LIBRARY:
- **VUE\$LIBRARY**
Search list including SWRK_VUE_LIBRARY:
- **Window application LOGIN, ENTER and EXIT procedures**

Session Manager and FileView

- In DECwindows/Motif, the Session Manager and FileView are the same shareable image
- New View from Session pulldown menu creates a view in the same process
- FileView from Application pulldown menu creates a view in a new process
- From DCL

Example

```
$ vue := $vue$master  
$ vue
```

or

```
$ mcr vue$master
```

Resource Files

- Found in `DECW$USER_DEFAULTS` or `DECW$SYSTEM_DEFAULTS`
- File type of `.DAT`
- Comments either `!` or `#`
- Resource names and values
- Documented in Appendix E of the `DECwindows/Motif User's Guide`
- Also found in `SWRK_VUE_LIBRARY`

Example

```
!  
! DECwindows resources:  
!     DECW$MAIL  
!  
! Purpose:  
!     Provide the resources for the DECwindows Mail.  
!  
Mail.mainPaneWindow.workPaneArea.upperArea.height: 61  
Mail.x:      35  
Mail.y:      75  
Mail.width:  605  
Mail.height: 305  
Mail.userProfile.iconPostText:  
Mail.userProfile.svn: yes  
Mail.userProfile.deliverFolder: New Mail  
Mail.userProfile.autoRefile: no  
Mail.userProfile.numDrawers: 1  
Mail.mailDrawer.1display: MAIL  
Mail.mailDrawer.1filespec: *MAIL  
Mail.initialState: 3  
  
MailRead.x:   35  
MailRead.y:   420  
MailRead.width: 605  
MailRead.height: 425  
MailRead*envelopeText.rows: 5  
  
MailSend.x:   35  
MailSend.y:   435  
MailSend.width: 605  
MailSend.height: 425
```

Profile Files

- Found in VUE\$LIBRARY
- File type of .VUE\$DAT
- Indexed files managed by Session Manager or File-View
- Use Utilities Any Item... and select Create Public Profile File to edit a profile file.
- Contains information on:
 - Menu items
 - Menus
 - Views
 - File Types
 - Etc...
- Documented in Chapter 14 of the DECwindows/Motif User's Guide
- Also found in SWRK_VUE_LIBRARY

SWRK_VUE_LIBRARY

Logical Name

- **System User Classes**
S_system-user-class
- **Application specific**
A_appl_envr_class
- **Determined in file SWRK_ALTERNATIVE_IDENTIFIERS.DA**
in SWRK_LCL_DIR:
Each entry is a **System User Class** or **Application Environment User Class** identifier name with an optional local identifier name.

Example

Example 1: Typical SWRK_ALTERNATIVE_IDENTIFIERS.DAT

```
!++
!  
! File:
!       SWRK_ALTERNATIVE_IDENTIFIERS
!  
! Purpose:
!       Provide ACME Widgets public
!       System User Classes and Application
!       Environment User Classes
!  
! History:
!       20-Aug-1992 by Simon L. Jackson
!       Initial version
!  
!--  
  
S_ALLIN1  
S_DEVELOPER  
S_USER  
A_FIN_DEV_MGR   CAPSUP  
A_FIN_MNT_MGR   CAPSUP  
A_MAN_DEV_MGR   DSSSUP  
A_MAN_MNT_MGR   DSSSUP  
A_RIM_DEV_MGR   FRSSUP  
A_RIM_MNT_MGR   FRSSUP
```

Example

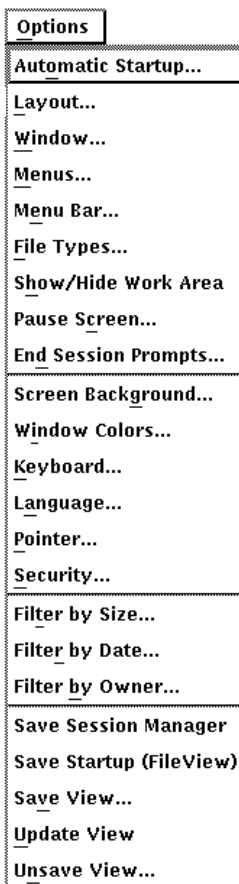
Example 2: Typical SWRK_VUE_LIBRARY logical name

```
$ show logical SWRK_VUE_library
"SWRK_VUE_LIBRARY" = "SWRK_DAT_ROOT:[ALL]" (LNM_JACK
    = "SWRK_DAT_ROOT:[DEVELOPER]"
    = "SWRK_DAT_ROOT:[OPERATOR]"
    = "SWRK_DAT_ROOT:[PATHWORKS]"
    = "SWRK_DAT_ROOT:[SYSTEM_MANAGER]"
    = "SWRK_DAT_ROOT:[USER]"
    = "DISK_DEV3:[SWRK.DAT]"
    = "DISK_PROD2:[SWRK.DAT]"
    = "DISK_APPL3:[SWPUB.DAT]"
    = "DISK_DEV3:[SWPUB.DAT]"
    = "DISK_DTST3:[SWPUB.DAT]"
    = "DISK_MNT3:[SWPUB.DAT]"
    = "DISK_MTST3:[SWPUB.DAT]"
"SWRK_VUE_LIBRARY" = "SWRK_DAT_ROOT:[NEVER]" (LNM$SY
```

Session Pulldown Menu



Options Pulldown Menu



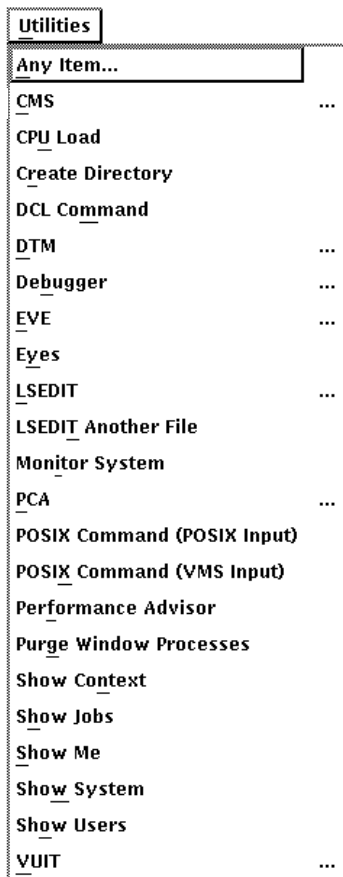
Views

- **Many attributes may be saved in a view.**
- **Select Save View form the Options pull down menu.**
- **Standard Views include:**
 - Session Manager**
 - Session Manager as FileView**
 - Startup**
- **Links to utilities and applications such as LSEDIT via device and directory**

Commands Pull-down Menu

| Commands | |
|--------------------|-----|
| <u>C</u> ompare | ... |
| <u>C</u> opy | ... |
| <u>D</u> elete | ... |
| <u>E</u> dit | ... |
| <u>P</u> rint | ... |
| <u>P</u> rotection | ... |
| <u>P</u> urge | ... |
| <u>R</u> ead | ... |
| <u>R</u> ename | ... |
| <u>R</u> un | ... |
| <u>S</u> earch | ... |
| <u>S</u> how File | ... |

Utilities Pulldown Menu



Network Commands

- **DECTERM icon-name window-name**
Optimized for local node
- **NETTERM node[,...] icon-name window-name**
- **PWD node[,...]**
No alias or network access logical used
- **RW node[,...] command**
Command in network process context the DECnet task-to-task link is left open.
- **RWI node[,...] command**
Command in interactive process context no DECnet task-to-task link left open.
- **TELL node[,...] command**

Network Commands (Cont)

- **To access a cluster or node, the user must have either a proxy at the destination or a logical of the form:**

```
$ define user_node node"user password"::
```

where user is the users username, node is the destination node, and password is the password at the destination node.

- **Logicals of this form may be defined in:**

```
SYS$LOGIN:SWRK_DEFINE_NETWORK_LOGICALS.COM
```

- **Output logged in**

```
SYS$LOGIN:NETSERVER.LOG
```

at the remote node.

Node Specifiers

All the *node[,...]* parameters may be substituted with one of the following keywords:

- **ALL**

The following logical name specifies the meaning of the **ALL** keyword:

```
SWRK_NET_CMD_ALL_TYPE
```

- **CLUSTER**

All nodes within the current cluster as defines by the logical name:

```
SYS$CLUSTER_NODES
```

- **CLUSTERS**

All clusters within the users network as defined by the logical name:

```
SYS$CLUSTERS
```

- **NODES**

All nodes within the users network as defined by the logical name:

```
SYS$NODES
```

Part III

Application Environment

Environments

- **USER**
- **GROUP**
- **APPLICATION**
 - + **Common (APPL)**
 - + **Development (DEV and FDEV)**
 - + **Development Testing (DTST)**
 - + **Maintenance (MNT)**
 - + **Maintenance Testing (MTST)**
 - + **Production (PROD and PRD)**
 - + **Training (TRNG)**

Logical Disks

Each environment has an associated logical disk structure, the logical name of which has the form:

```
DISK_envr:
```

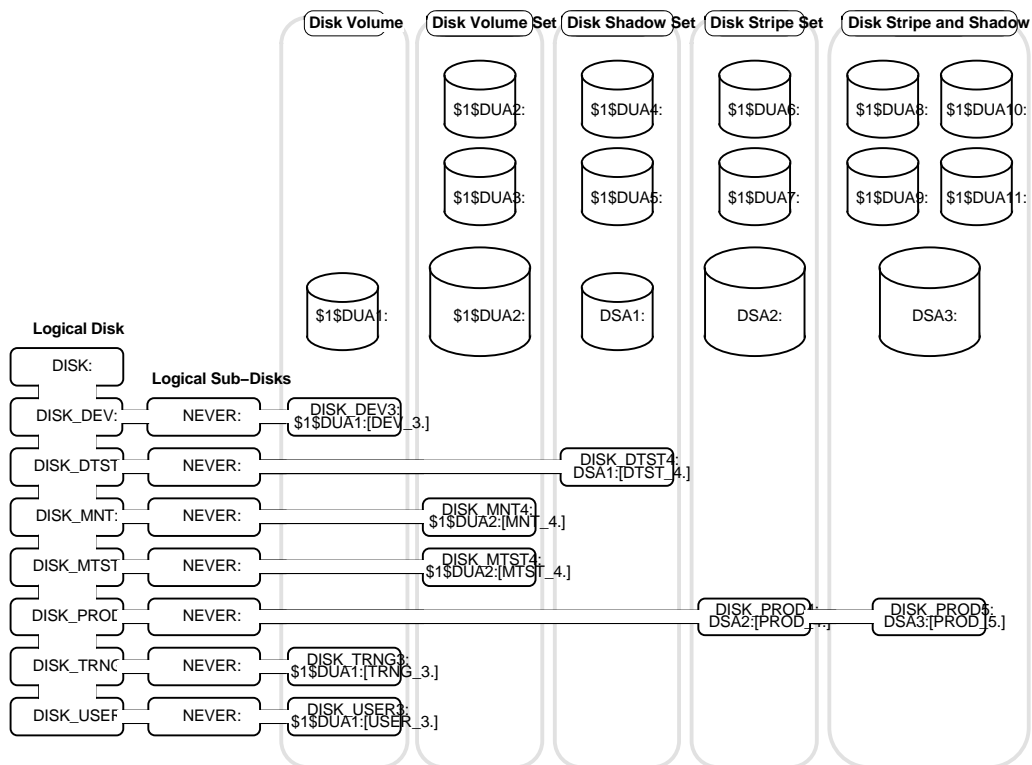
This logical name is a search list of logical sub-disks, each of which is a root directory on a disk volume.

Example

```
$ show logical disk_dev
  "DISK_DEV" = "NEVER:" (LNM$SYSTEM_TABLE)
             = "DISK_DEV3:"
             = "DISK_DEV4:"
1  "DISK_DEV3" = "$1$DUA2:[DEV_3.]" (LNM$SYSTEM_TABLE)
1  "DISK_DEV4" = "$1$DUA3:[DEV_4.]" (LNM$SYSTEM_TABLE)
```

- **The NEVER: placeholder prevents creation of files directly in DISK_DEV:**
- **In public installations, this structure must still exist, usually by setting alias directory entries and defining the logical disk structure in the site specific login procedure.**
- **LOGICALS.COM procedures for defining logical names at boot or login time parse directories and files to eliminate the search list.**

Overview of Disk Structure



Changing Contexts

The **CONTEXT** command includes the following sub-commands:

- **APPLICATION** *appl envr {vrnt/vrsn}*
Change the context to the indicated application environment. May use **ENTER.COM**, **EXIT.COM**, **LOGICALS.COM**.
- **ENVIRONMENT** *envr {vrnt/vrsn}*
Change the context to the indicated environment of the current application. May use **ENTER.COM**, **EXIT.COM**, **LOGICALS.COM**.
- **GROUP** *group*
Change the context to the indicated group. May use **ENTER.COM**, **EXIT.COM**, **LOGICALS.COM**.
- **HOME**
Change the context to the users **HOME** area. May use **HOME.COM**.
- **VARIANT** *vrnt*
Change the context to the indicated variant of the current application environment. May use **ENTER.COM**, **EXIT.COM**, **LOGICALS.COM**.
- **VERSION** *vrsn*

Change the context to the indicated version of the current application environment. May use ENTER.COM, EXIT.COM, LOGICALS.COM.

Each of the DCL command procedures which may be used during the move resides in the associated software directory.

Context Scopes

The application environments also have a scope attribute.

The supported scopes include:

- **COMMON**
- **SPECIFIC**
- *other*)

These are supported by the following qualifiers on various commands:

```
/COMMON  
/SPECIFIC  
/SCOPE=other)
```

Directories with an extra search list item for the non **COMMON** scopes include:

Architecture Independent Library
Data
Documemtation
Library
Runtime
Software
Testing
Work

Context Command Procedures

- **LOGICALS.COM**
Used to define application environment specific logical names. See **SWRK_SFT_DIR:LOGICALS_APPL_ENVR.TEMPLATE** for a complete example.
- **ENTER.COM**
Used to define application specific symbols and job and/or process logical names and inter-application dependencies.
- **EXIT.COM**
Used to delete application environment specific items defined in **ENTER.COM**. No need to remove application inter-dependencies.

Application Directories

Application directories are of the form:

`DISK_envr:[appl.dir-cod]`

Table 2: Application Directory Usage

| Directory | SysWorks Default | APPL | FDEV | DEV | MNT | DTST | MTST | PROD TRNG |
|----------------------------------|-----------------------------------|------|------|-----|-----|------|------|-----------|
| Software | SFT | No | Yes | Yes | Yes | Yes | Yes | Yes |
| | VAR <i>vrnt</i> .SFT | No | No | Yes | No | Yes | No | No |
| | <i>vrsn</i> .SFT | No | No | No | Yes | No | Yes | No |
| Developer specific software | SFT. <i>user</i> | No | Yes | Yes | Yes | No | No | No |
| | VAR <i>vrnt</i> .SFT. <i>user</i> | No | No | Yes | No | No | No | No |
| | <i>vrsn</i> .SFT. <i>user</i> | No | No | No | Yes | No | No | No |
| Documentation | DOC | No | Yes | Yes | Yes | Yes | Yes | Yes |
| | VAR <i>vrnt</i> .DOC | No | No | Yes | No | Yes | No | No |
| | <i>vrsn</i> .DOC | No | No | No | Yes | No | Yes | No |
| Developer specific documentation | DOC. <i>user</i> | No | Yes | Yes | Yes | No | No | No |
| | VAR <i>vrnt</i> .DOC. <i>user</i> | No | No | Yes | No | No | No | No |
| | <i>vrsn</i> .DOC. <i>user</i> | No | No | No | Yes | No | No | No |
| Kit | KIT | Yes | No | No | No | Yes | Yes | No |
| Distribution | KIT. <i>vrsn</i> | Yes | No | No | No | No | No | No |
| Data | DAT | Opt | Yes | Yes | Yes | Yes | Yes | Yes |
| | VAR <i>vrnt</i> .DAT | No | No | Yes | No | Yes | No | No |
| | <i>vrsn</i> .DAT | No | No | No | Yes | No | Yes | No |
| Journal | JNL | No | Yes | Yes | Yes | Yes | Yes | Yes |
| | VAR <i>vrnt</i> .JNL | No | No | Yes | No | Yes | No | No |
| | <i>vrsn</i> .JNL | No | No | No | Yes | No | Yes | No |
| Runtime | RUN | No | Yes | Yes | Yes | Yes | Yes | Yes |

Table 2 (Cont.): Application Directory Usage

| Directory | SysWorks Default | APPL | FDEV | DEV | MNT | DTST | MTST | PROD TRNG |
|---|--------------------|------|------|-----|-----|------|------|-----------|
| User runtime | VARvrnt.RUN | No | No | Yes | No | Yes | No | No |
| | vrsn.RUN | No | No | No | Yes | No | Yes | No |
| | RUN.user | No | Yes | Yes | Yes | Yes | Yes | Yes |
| | VARvrnt.RUN.user | No | No | Yes | No | Yes | No | No |
| | vrsn.RUN.user | No | No | No | Yes | No | Yes | No |
| Repository | CDD | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.CDD | No | No | Yes | No | Yes | No | No |
| | vrsn.CDD | No | No | No | Yes | No | Yes | No |
| Architecture independent library | AIL | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.AIL | No | No | Yes | No | Yes | No | No |
| Developer specific architecture independent library | vrsn.AIL | No | No | No | Yes | No | Yes | No |
| | AIL.user | No | Yes | Yes | Yes | No | No | No |
| | VARvrnt.AIL.user | No | No | Yes | No | No | No | No |
| Library | vrsn.AIL.user | No | No | No | Yes | No | No | No |
| | LIB | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.LIB | No | No | Yes | No | Yes | No | No |
| | vrsn.LIB | No | No | No | Yes | No | Yes | No |
| Developer specific library | LIB.user | No | Yes | Yes | Yes | No | No | No |
| | VARvrnt.LIB.user | No | No | Yes | No | No | No | No |
| | vrsn.LIB.user | No | No | No | Yes | No | No | No |
| Compatibility Dictionary | AIL.DMU | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.AIL.DMU | No | No | Yes | No | Yes | No | No |
| SCA Library | vrsn.AIL.DMU | No | No | No | Yes | No | Yes | No |
| | LIB.SCALIB | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.LIB.SCALIB | No | No | Yes | No | Yes | No | No |
| | vrsn.LIB.SCALIB | No | No | No | Yes | No | Yes | No |
| Work | WRK | No | Yes | Yes | Yes | Yes | Yes | No |
| | VARvrnt.WRK | No | No | Yes | No | Yes | No | No |

Table 2 (Cont.): Application Directory Usage

| Directory | SysWorks Default | APPL | FDEV | DEV | MNT | DTST | MTST | PROD TRNG |
|-------------|----------------------------|------|------|-----|-----|------|------|-----------|
| User work | <i>vrsn.WRK</i> | No | No | No | Yes | No | Yes | No |
| | <i>WRK.user</i> | No | Yes | Yes | Yes | Yes | Yes | No |
| | <i>VAR vrnt.WRK.user</i> | No | No | Yes | No | Yes | No | No |
| Scratch | <i>vrsn.WRK.user</i> | No | No | No | Yes | No | Yes | No |
| | <i>SCR</i> | No | Yes | Yes | Yes | Yes | Yes | Yes |
| | <i>VAR vrnt.SCR</i> | No | No | Yes | No | Yes | No | No |
| Source | <i>vrsn.SCR</i> | No | No | No | Yes | No | Yes | No |
| | <i>SRC</i> | Yes | Yes | Opt | No | No | No | No |
| CMS library | <i>SRC.CMSLIB</i> | Yes | Yes | Opt | Yes | No | No | No |
| Test | <i>TST</i> | No | Yes | Yes | Yes | Yes | Yes | No |
| | <i>VAR vrnt.TST</i> | No | No | Yes | No | Yes | No | No |
| | <i>vrsn.TST</i> | No | No | No | Yes | No | Yes | No |
| DTM library | <i>TST.DTMLIB</i> | No | Yes | Yes | Yes | Yes | Yes | No |
| | <i>VAR vrnt.TST.DTMLIB</i> | No | No | Yes | No | Yes | No | No |
| | <i>vrsn.TST.DTMLIB</i> | No | No | No | Yes | No | Yes | No |

Changing Directory Code Defaults

- **SDC_xxx**
For directory code *xxx* the symbol **SDC_xxx** may contain the site specific alternative directory code. For example if the symbol **SDC_SFT** has a value of **EXE**, software will be located in **[.EXE]** directories. This symbol is normally defined in the site specific pre login command procedure.
- **DIR_xxx**
For directory code *xxx* the symbol **DIR_xxx** may contain the site or application specific alternative directory code. For example if the symbol **DIR_SFT** has a value of **SN_CAP_EXE:**, software will be located in that directory. This symbol overrides any **SDC_xxx** symbol. This symbol is normally defined in the application environment **ENTER.COM** command procedure and deleted by **EXIT.COM**.

Editing

Table 3: Editors and Modes

| Editor | Direct | Subprocess | Window |
|---------------|---------------|-------------------|---------------------------------|
| EDT | Yes | No | No |
| EVE | Yes | Yes | Yes |
| LSEDIT | Yes | Yes | Yes, with DCL connection |

Editing

Table 4: Editor Key Extensions

| Key | Action |
|---------------|---|
| F10 | Exit - behavior depends upon mode. |
| F17 | Return to DCL - only used with the subprocess mode |
| Gold-= | Toggle between one window and split windows |
| Gold-+ | Split the current window. |
| Gold- | Remove the current window |
| Gold-[| Move window one screen to the left. |
| Gold-{ | Move window to left of the buffer. |
| Gold-' | Move window to cursor. |
| Gold-} | Move window to right of the buffer. |
| Gold-] | Move window one screen to the right. |
| Gold-B | Toggle between the current buffer and the list of buffers. |
| Gold-C | Close the current buffer. |
| Gold-D | Delete the current buffer. |
| Gold-E | Same as F10. |
| Gold-F | Fill the currently selected region or paragraph. |
| Gold-M | Toggle between the current buffer and the message buffer. |
| Gold-Q | Quit - behavior depends upon mode. |
| Gold-S | Toggle between the current buffer and the list of system buffers. |
| Gold-T | Toggle between narrow and wide windows. |
| Gold-W | Write out the current buffer. |

Editing

Table 5: Editor Key Mode Differences

| Mode | Key | Semantics |
|-------------------|------------------------|--|
| Direct | F10, Gold-E | Close all buffers and exit back to DCL. |
| Subprocess | Gold-Q | Delete all buffers and exit back to DCL. |
| | F10, Gold-E | Close current buffer and return to DCL. |
| | F17 | Return to DCL. |
| Window | Gold-Q | Delete current buffer and return to DCL. |
| | F10, Gold-E | Selection causes implied APPLICATION command. Write current buffer. |
| | Gold-Q | Delete current buffer. |

LSE Extensions

- **When the EDIT command is used from DCL, the most recently used DECwindows/Motif LSE session will be automatically restored and reactivated. If none is available, a sub-process LSE session will be created.**
- **Various LSE commands have their function changed in line with SysWorks extensions. These include:**
 - + CREATE ELEMENT**
 - + FETCH**
 - + REPLACE**
 - + RESERVE**
 - + UNRESERVE**
- **The following SysWorks extension is not yet available directly from LSE:**
 - + PROMOTE GENERATION**

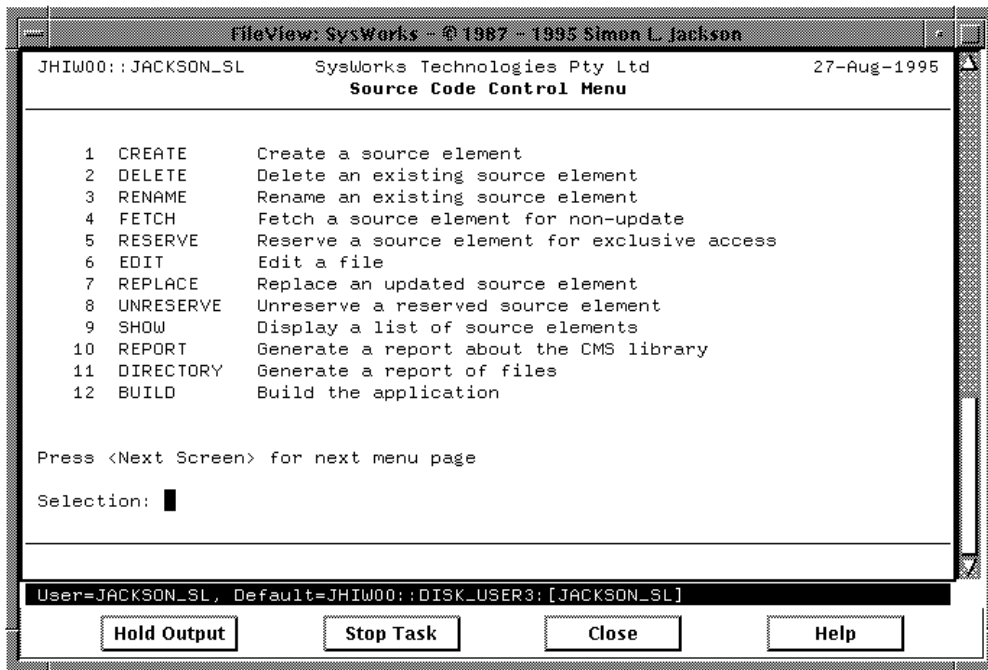
Part IV

Application Development

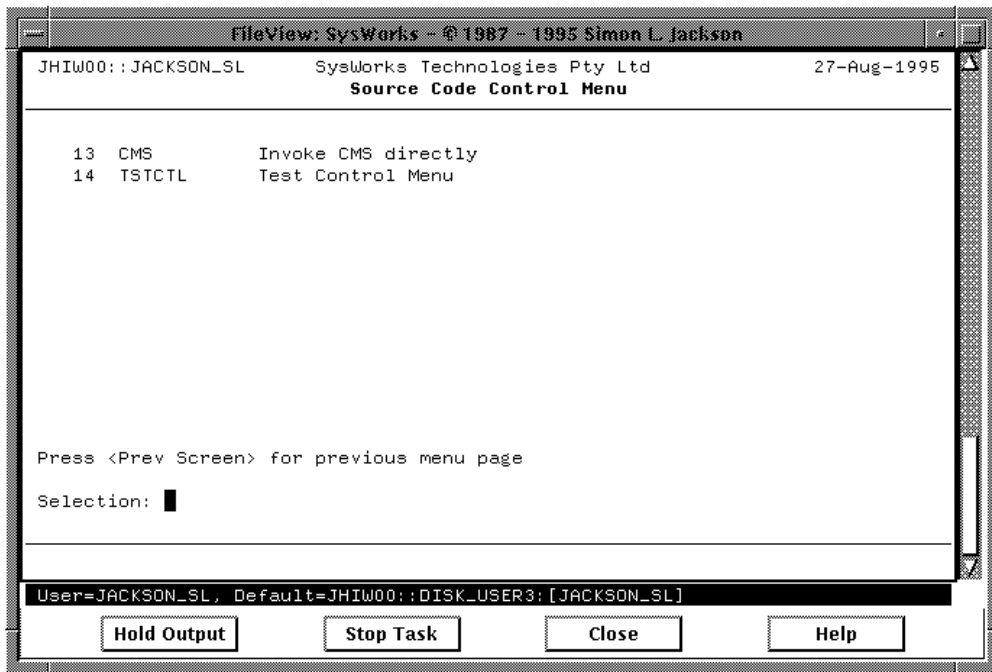
CMS Concepts

- **ELEMENT**
A source file
- **GROUP**
A collection of zero or more elements
- **GENERATION**
A version of a source file
- **CLASS**
A collection of zero or more generations
- **PATH (SysWorks extension)**
A search list of generation expressions

Source Control



Source Control (Cont)



Source Control (Cont)

- Acts as a front end for CMS.
- The keyword **ELEMENT** in commands such as **CREATE** does not need to be supplied; the second parameter defaults to **ELEMENT** when it is not **CLASS**, **ELEMENT** or **GROUP**.
- If an *appl_CMS_PATH* logical name is defined (typically in the application logical name table), the behaviour of CMS commands change to include handling the classes and/or generations specified.
- If the *appl_CMS_PATH* logical name is present, an *appl_CMS_VARIANT* logical name may further change the behaviour of the CMS commands.
- The **BUILD** command is the same as the **DCL BUILD** command, except that a series of questions are asked in order to build up the command's qualifiers.

SRCCTL vs CMS

Behaviour changes with a
appl_CMS_PATH

- **CREATE ELEMENT**
Creates the element. If a variant was specified, it is reserved and replaced with the variant. The appropriate generation is then inserted into the first class in the path.
- **DELETE ELEMENT**
Removes a generation from the first class in the path in which one is found. It does not actually delete the element.
- **RENAME ELEMENT**
Removes a generation from the first class in the path in which one is found. If the new name already exists, creates a new or variant generation of it is created and inserted into the first class in the path. Otherwise, a new element is created, and the new generation is inserted into the first class in the path as per the CREATE command.
- **FETCH**
Fetches the first generation from found in the path.

SRCCTL vs CMS (cont)

- **RESERVE**
Reserves the first generation from found in the path. This must be the latest in its branch otherwise a promotion required error will be produced.
- **EDIT**
Edits a reserved source. Primarily useful from within a character cell terminal environment. Also accepts a wildcard file specification, and 'feeds' through each of the files to be edited.
- **REPLACE**
Replaces a reserved generation. There is no effective change of operation from CMS.
- **UNRESERVE**
Unreserves a reserved generation. There is no effective change of operation from CMS.
- **SHOW ELEMENT**
Shows the generations within the path rather than all elements.

Development Commands

- **BUILD[/qualifiers] [target]**
- **CHANGE[/qualifiers] source-file[,...] search-string[,...]
replace-string[,...]**
- **COMPARE[/qualifiers] new-area[/qualifiers] old-
area[/qualifiers]**
- **COMP*ILE[/qualifiers] source-file[,...]**
- **CVTMMS source-file[,...] [target-mms-script]**
- **DO[/qualifiers] command**

Commands with Context

Commands which support context include:

- **BUILD**
- **COMPILE**
- **DO**

Qualifiers include:

/AFTER
/BATCH
/DETACHED
/INTERACTIVE
/KEEP
/LOG
/SUBPROCESS
/SYNCHRONIZE

Commands with Memory

Commands which support memory include:

- **BUILD**
- **COMPILE**

Qualifiers include:

/CLUSTER
/DEFAULTS
/MEMORY
/NODE
/SAVE
/UNSAVE

BUILD

Format:

```
BUILD[/qualifiers] [target]
```

Multiple phases (with the /PHASES qualifier) including:

- **UPDATE**
Copy any sources in the user work directory which are newer than the last BUILD.LOG into the work directory.
- **FETCH**
Bring the work directory into line with the CMS class by fetching any newer sources from the CMS library
- **SETUP**
Perform any special operations needed to perform the SCA and/or RULES phases such as building MMS generators.
- **SCAN**
Scan the CMS library and produce a set of dependency files needed during the RULES and DESCRIP phases. Several abstract targets are generated such as SCRIPT_LIST and FORM_LIST.
Resulting MMS scripts are in the library directory.

BUILD (cont)

- **RULES**
Convert most sources into MMS scripts. These are appended together to produce *appl_APPENDS* which is used during the DESCRIP phase.
- **DESCRIP**
Actual compile, link and build actions. This is the traditional MMS or makefile.
- **KITBLD**
Takes the resultant software and creates a kit from it.

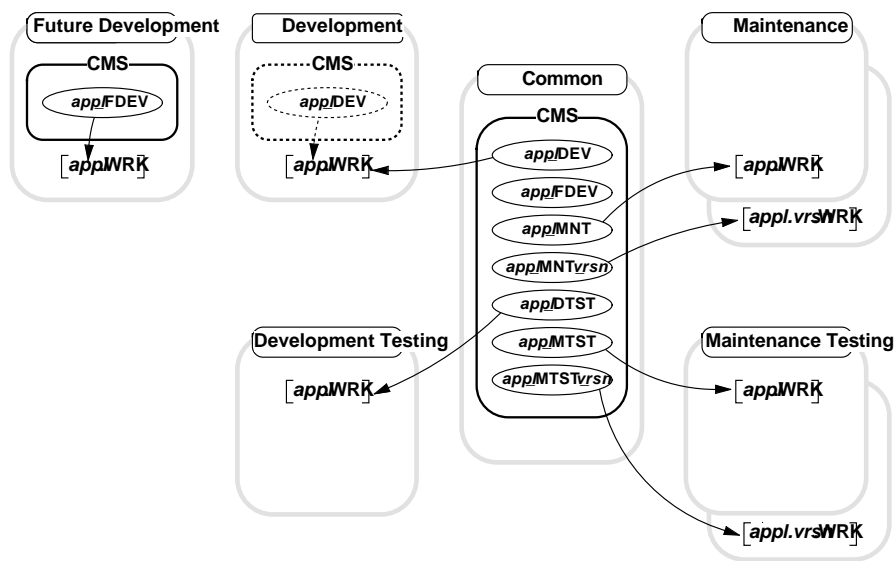
BUILD (cont)

Qualifiers include:

- /CMS
- /DEBUG
- /DESCRIP
- /FETCH
- /FROM_SOURCES
- /KITBLD
- /LIST
- /MAP
- /MMS
- /PHASES
- /RULES
- /UPDATE

BUILD (cont)

Figure 1: BUILD FETCH Phase Flow



BUILD SCAN Phase Results

Table 6: SCAN Phase Generated Files

| Generated File | Usage |
|-----------------------------------|---|
| <i>appl_CONSTRAINTS</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_table_CKn</i> .SQL, <i>appl_table_FKn</i> .SQL and <i>appl_table_PK</i> .SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_DOCUMENTATION</i> .MMS | A dependency list of all the documentation targets. |
| <i>appl_DOMAINS</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_domain_DOM</i> .SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_DOMAIN_SDML_LIST</i> .MMS | A dependency list of all the generated SDML domain documentation sources. |
| <i>appl_FORM_LIST</i> .MMS | A dependency list of all the generated DECforms form MMS scripts, so that a generated linker options file may be regenerated when any DECforms form is modified. This regeneration is typically performed near the end of the RULES phase. |
| <i>appl_HELP</i> .MMS | A dependency list of all the help targets. |
| <i>appl_INDICES</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_index_IDX</i> .SQL or <i>appl_index_PIDX</i> .SQL or <i>appl_index_SIDXn</i> .SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_LINK_OPT_LIST</i> .MMS | A dependency list of all the Linker options sources. |
| <i>appl_MSGHLP</i> .MMS | A dependency list of all the message help targets. |
| <i>appl_PROTECTIONS</i> .SQL | An SQL source which will apply a standard protection to each appropriate object in the database. |

Table 6 (Cont.): SCAN Phase Generated Files

| Generated File | Usage |
|----------------------------------|---|
| <i>appl_ROUTINES</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_routine</i> _RTN.SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_SCHEMA</i> .MMS | A dependency list of all the Rdb database schema sources. This script is usually included in the application DESCRIP.MMS script. |
| <i>appl_STORAGE_MAPS</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_storage_map</i> _SM.SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_TABLES</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_table</i> _TBL.SQL. Note that SQL constraints definitions are embedded within the table definition sources. |
| <i>appl_TABLE_SDML_LIST</i> .MMS | A dependency list of all the generated SDML table documentation sources. |
| <i>appl_TARGETS</i> .MMS | A dependency list of all the targets. |
| <i>appl_TASK_LIST</i> .MMS | A dependency list of all the generated ACMS task MMS scripts, so that a generated ACMS task group may be regenerated when any ACMS task is modified. This regeneration is typically performed near the end of the RULES phase. |
| <i>appl_TRIGGERS</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_trigger</i> _TRG.SQL or <i>appl_trigger</i> _TRGR.SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_VIEWS</i> .SQL | An SQL script containing a list of all the sources with a file name and type of the form <i>appl_view</i> _VIEW.SQL or <i>appl_view</i> _VW.SQL. The @ character precedes each source file specification so that this procedure can be used from within the SQL utility. |
| <i>appl_VIEW_SDML_LIST</i> .MMS | A dependency list of all the generated SDML view documentation sources. |

BUILD RULES Phase Results

Table 7: RULES Phase Generated Files

| Generated File | Usage |
|------------------------------|--|
| <i>appl_DEPENDENCIES.MMS</i> | An MMS script containing all the generated dependencies used to build the application. |

CHANGE

Format:

```
CHANGE[/qualifiers] -  
  source-file[,...] -  
  search-string[,...] -  
  replace-string[,...]
```

- **Simple search and replace on source files.**
- **Each occurrence of a search string is replaced by its corresponding replace string.**
- **If there are insufficient replace strings, the last one is used multiple times. For example:**

```
$ change a.txt a1,a2,a3 b1,b2
```

would result in all occurrences of a1 being changed to b1 and all occurrences of a2 and a3 being changed to b2.

COMPARE

Format:

```
COMPARE[/qualifiers] -  
  new-area[/qualifiers] -  
  old-area[/qualifiers]
```

- **Compare the revision dates of files or CMS generations.**
- **Generates a DCL command procedure to bring them in line.**
- **Used in the change control TRIAL ask.**
- **Each of the two parameters may be one of:**
 - **file-dir**
 - **cms-dir/CMS**
 - **cms-dir/CMS/PATH=cms-class-list**
- **Uses a rule based system to determine the actions to perform.**
- **Over 150 rules used.**
- **Other qualifiers include:**
 - /BOTH**
 - /OUTPUT**
- **Useful to check for accidental changes or additions to work directories etc.**

COMPILE

Format:

```
COMPILE[/qualifiers] source-file[,...]
```

- **Compiles a source to produce its associated target.**
- **Other qualifiers include:**

```
/AFTER  
/BATCH  
/DEBUG  
/DETACHED  
/SUBPROCESS
```

Language Summary

Table 8: Language Support Summary

| Language or Product | Source File Types | Compile | Target Directory | Target File Types |
|---------------------|---|---------|---|--|
| ACA Services | .COL, .CRL | Yes | Library Software | .C, .MMS_INC .CO, .CR |
| ACMS | .CRL_IND | No | Library | .CRL, .MMS_INC |
| | .ADF, .GDF, .MDF, .TDF | Yes | Architecture Independent Library Software | .MMS_INC, .OPT, .OPT_INC, .TAG_CDD .ADB, .MDB, .TDB |
| | .ADF_INC, .GDF_INC, .MDF_INC, .TDF_INC | No | Architecture Independent Library | .MMS_INC |
| Ada ¹ | .ADA | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| Basic ¹ | .BAS | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| C | .C | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| | .H | No | Library | .MMS_INC, .TAG_INC_1, .TAG_INC_2 |
| C++ | .CXX | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| | .HXX | No | Library | .MMS_INC, .TAG_INC_1, .TAG_INC_2 |
| | .IXX | No | Library | .MMS_INC, .TAG_INC_1, .TAG_INC_2 |
| CDD | .CDDL, .DDL | Yes | Architecture Independent Library | .MMS_INC, .TAG_CDD |

¹The MMS generators for this language and its associated associated SQL precompiler generators will be released in a future version of SysWorks Developer.

Table 8 (Cont.): Language Support Summary

| Language or Product | Source File Types | Compile | Target Directory | Target File Types |
|-----------------------------|-------------------|---------|----------------------------------|---|
| CDD/Plus & CDD/Repository | .CDO | Yes | Architecture Independent Library | .MMS_INC, .TAG_CDD |
| Cobol | .COB, .TXT | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP, .TLB |
| Command Language Definition | .CLD | Yes | Library | .MMS_INC, .OBJ, .TAG_EP |
| | .CLD_INC | No | Library | .MMS_INC, .TAG_EP |
| | .CLD_INC_SRC | Yes | Software | .CLD_INC |
| Datatrieve | .DTR | Yes | Architecture Independent Library | .MMS_INC, .TAG_CDD |
| DECdocument | .GRA, .SDML | Yes | Library | .HLP, .MMS_INC, .TAG_SDML, .TXT |
| | .SDML_INC | No | Library | .MMS_INC, .TAG_SDML Documentation, .DECW\$BOOK, .DECW\$BOOK, .GIF, .HLB, .HTML, .PS, .RELEASE_NOTES |
| DECwindows | .UIL | Yes | Architecture Independent Library | .MMS_INC |
| | | | Software | .UID |
| FMS | .FRM | Yes | Library | .MMS_INC, .OBJ |
| Fortran | .FOR | Yes | Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| HTTP | .SHTML | Yes | Documentation | .MMS_INC |
| | | | Documentation | .HTML |

Table 8 (Cont.): Language Support Summary

| Language or Product | Source File Types | Compile | Target Directory | Target File Types |
|---------------------|---|---------|---|--|
| | .GIF_CPY, .HTIMAGE_CPY, .HTM_CPY, .HTML_CPY, .HTMLS_CPY, .HTMLX_CPY, .IM-AGEMAP_CPY, .SHTML_CPY | Yes | Documentation | .GIF, .HTIMAGE, .HTM, .HTML, .HTMLS, .HTMLX, .IMAGEMAP, .SHTML |
| Java | .JAVA | Yes | Architecture Independent Library Software | .MMS_INC .CLASS |
| Linker | .OPT, .OPT_APP, .OPT_INC | Yes | Library | .MMS_INC, .OPT_EXP |
| Macro-32 | .MAR, .MLB | Yes | Software Library | .EXE .MMS_INC, .OBJ, .OLB, .TAG_EP |
| ObjectBroker | .IDL | Yes | Software Library | .MLB .C, .MMS_INC |
| Pascal | .PAS | Yes | Software Library | .IR .MMS_INC, .OBJ, .OLB, .PEN, .TAG_EP |
| PL/1 ¹ | .PLI | Yes | Library | .MMS_INC, .OBJ, .OLB |
| PowerHouse | .QKS, .QTS, .QZS | Yes | Architecture Independent Library | .MMS_INC, .TAG_INC |
| | .QKS_INC, .QTS_INC, .QZS_INC | No | Architecture Independent Library Software | .MMS_INC, .TAG_INC .QKC, .QTC, .QZC |

¹The MMS generators for this language and its associated associated SQL precompiler generators will be released in a future version of SysWorks Developer.

Table 8 (Cont.): Language Support Summary

| Language or Product | Source File Types | Compile | Target Directory | Target File Types |
|---------------------|---|---------|---|-------------------------------|
| Rdb | .RDO | No | Architecture Independent Library | .CDO_GEN, .MMS_INC, .TAG |
| | .RBA, .RC, .RCO, .RFO, .RPA | Yes | Architecture Independent Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| | .SAD, .SBA, .SC, .SCO, .SFO, .SPA, .SPL | Yes | Architecture Independent Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| | .SQL | No | Architecture Independent Library | .CDO_GEN, .MMS_INC, .TAG |
| | .SQLMOD | Yes | Architecture Independent Library | .MMS_INC, .OBJ, .OLB, .TAG_EP |
| Runoff | .RND | Yes | Architecture Independent Library Documentation.DOC | .MMS_INC |
| | .RNH | Yes | Architecture Independent Library Documentation.HLB | .HLP, .MMS_INC |
| | .RNM, .RNR | Yes | Architecture Independent Library Documentation.MAN, .RELEASE_NOTES | .MMS_INC |
| TDMS | .FRM_TDMS, .RDF | Yes | Architecture Independent Library | .MMS_INC, .TAG_CDD |
| | .LDF | Yes | Architecture Independent Library Software | .MMS_INC, .TAG_CDD .RLB |

Table 8 (Cont.): Language Support Summary

| Language or Product | Source File Types | Compile | Target Directory | Target File Types |
|---------------------|-------------------|---------|----------------------------------|--|
| DECdocument | .GRA, .SDML | Yes | Architecture Independent Library | .BRF, .MMS_INC |
| | .SDML_INC | No | Architecture Independent Library | .DECW\$BOOK, .PS, .RELEASE_NOTES, .TXT .MMS_INC |

CVTMMS

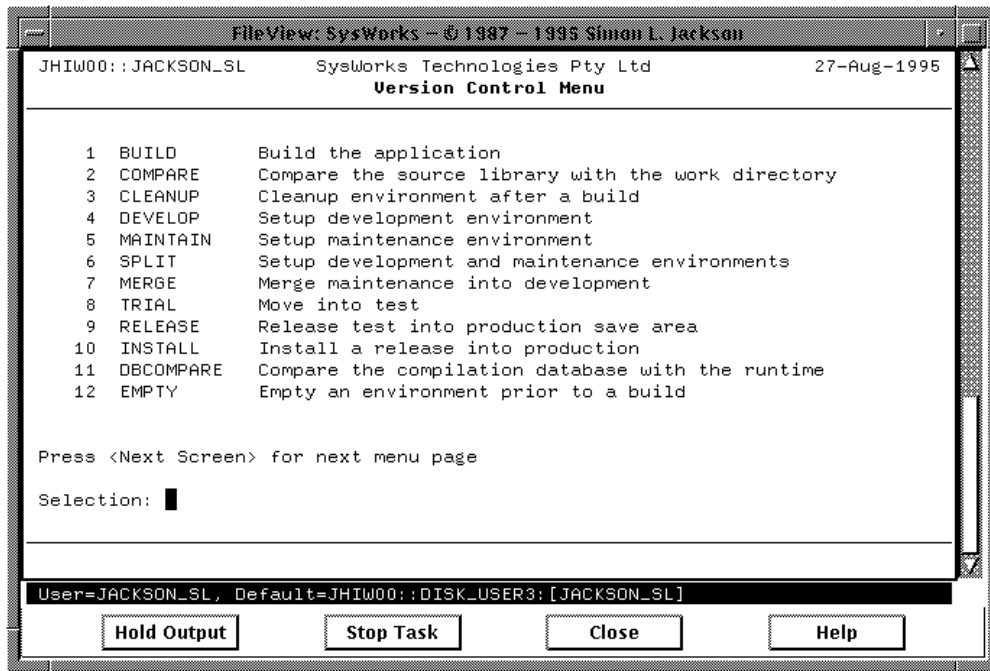
Format:

`CVTMMS source-file[,...] [target-mms-script]`

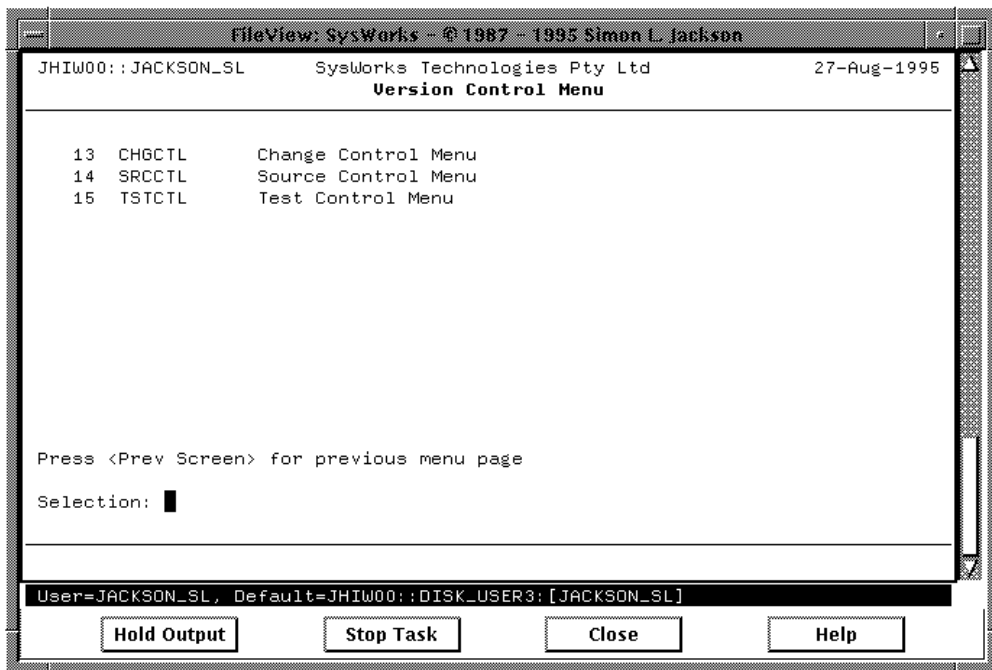
Converts the specified sources into MMS scripts.

The default file type is .MMS_INC.

Version Control

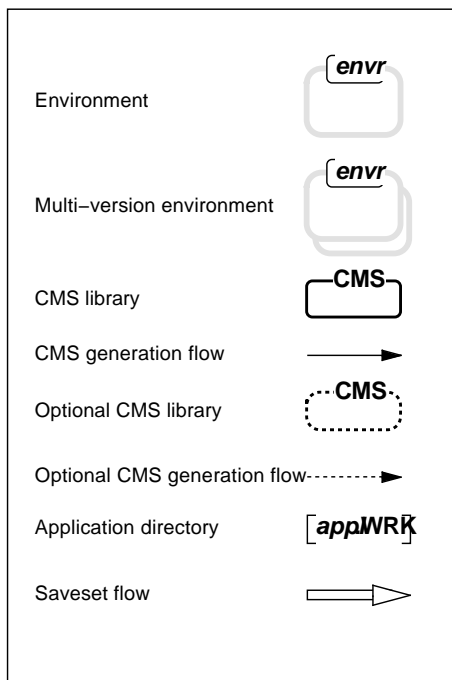


Version Control (cont)



Version Control (cont)

Figure 2: VSNCTL Diagrams Legend



Version Control (cont)

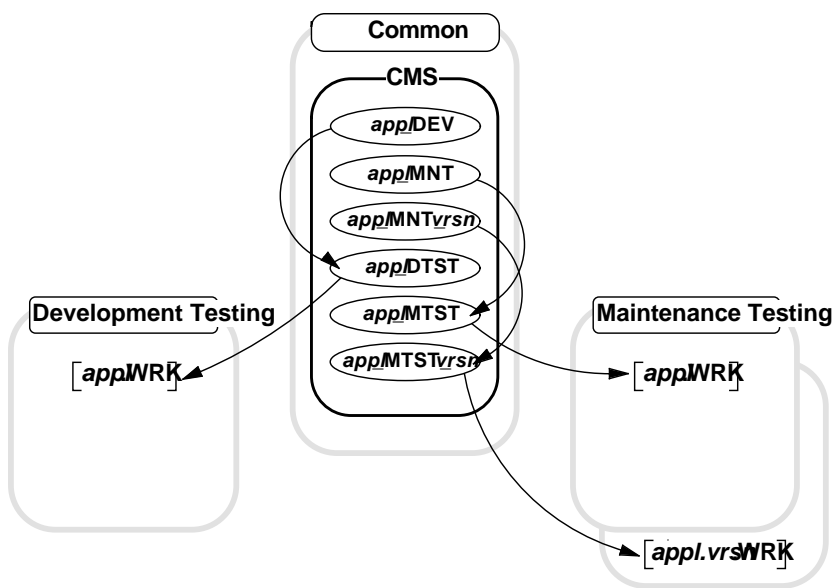
TRIAL

- **Updates target environment CMS library and/or class (uses COMPARE command).**
- **Builds in target environment.**

```
$ vsnctl trial
Target environment [DTST]:
Override CMS reservations (Yes/No) [No]:
Build (Yes/No) [Yes]:
From sources or work area (Source/Work) [Work]:
Execution (Batch/Detached/Online/Subprocess) [Batch]:
Batch queue [SYS$BATCH]:
Execute after [NOW]:
```

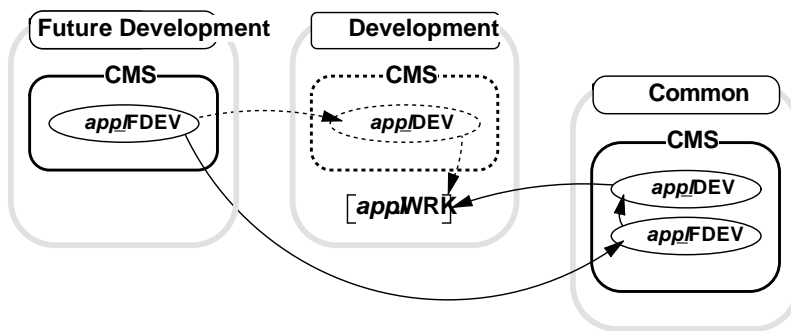
Version Control (cont)

Figure 3: TRIAL flow



Version Control (cont)

Figure 4: TRIAL flow from FDEV to DEV



Version Control (Cont)

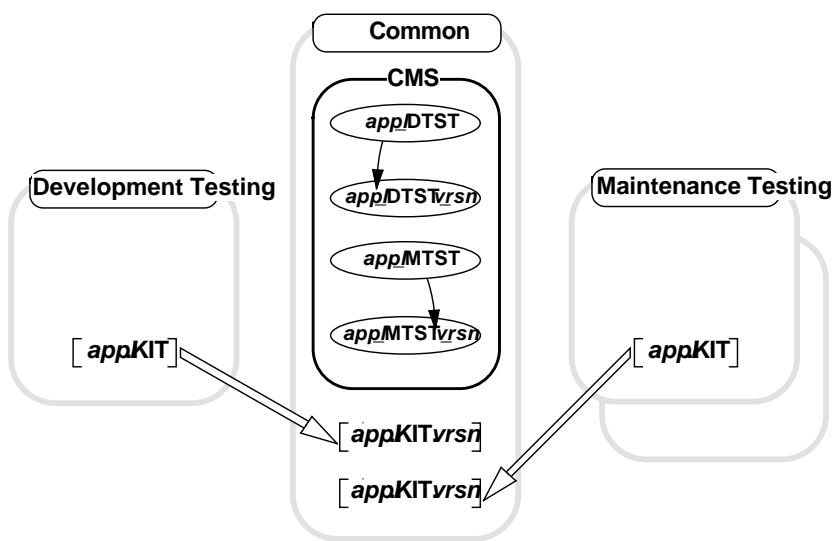
RELEASE

- **Releases a build testing environment source as a production class.**

```
$ vsnctl release
Test environment [DTST]:
Version [V1.0]:
Execution (Batch/Detached/Online/Subprocess) [Batch]:
Batch queue [SYS$BATCH]:
Execute after [NOW]:
```

Version Control (cont)

Figure 5: Release Flow



Version Control (Cont)

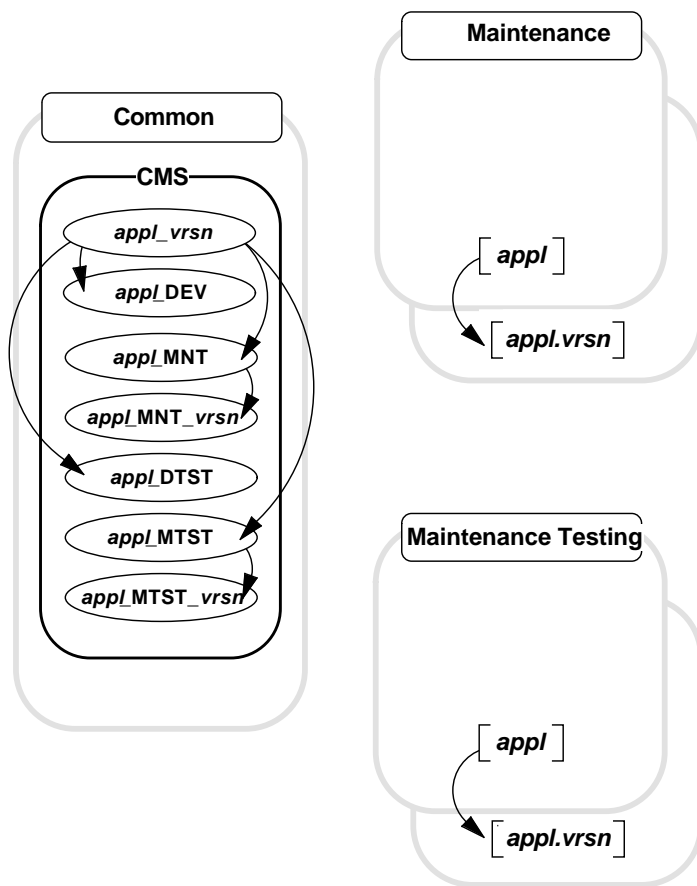
SPLIT

- **Takes a released version and splits it into a development and maintenance version.**
- **Builds the new development and maintenance areas.**

```
$ vsnctl split
Version: V1.0
Development environment [DEV]:
Build (Yes/No) [Yes]:
Development testing environment [DTST]:
Maintenance environment [MNT]:
Build (Yes/No) [Yes]:
Maintenance testing environment [MTST]:
Keep existing maintenance version (Yes/No) [Yes]:
Execution (Batch/Detached/Online/Subprocess) [Batch]:
Batch queue [SYS$BATCH]:
Execute after [NOW]:
```

Version Control (cont)

Figure 6: Split Flow



Version Control (Cont)

MERGE

- **Updates target environment CMS library and/or class (uses COMPARE command).**
- **Leaves unresolved merges reserved for manual resolution.**
- **Doesn't delete sources from the target environment.**

Example:

```
$ vsnctl merge
Target environment [MNT]:
Override CMS reservation check (Yes/No) [No]:
Since [BEGINNING]:
Execution (Batch/Detached/Online/Subprocess) [Batch]:
Batch queue [SYS$BATCH]:
Execute after [NOW]:
```

Version Control (Cont)

INSTALL

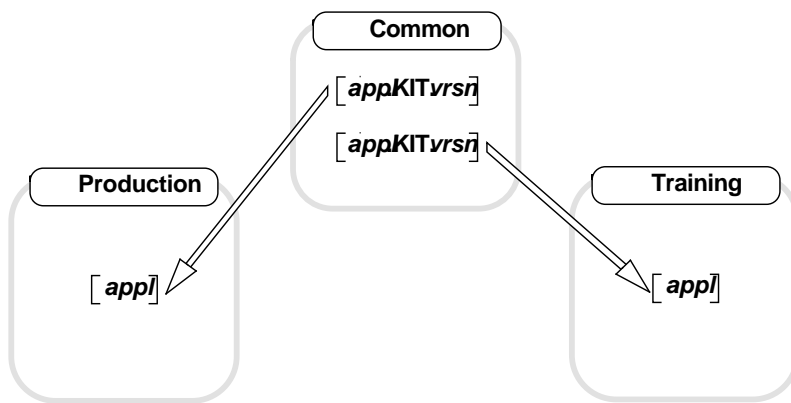
- **Installs released savesets into production or training.**

Example:

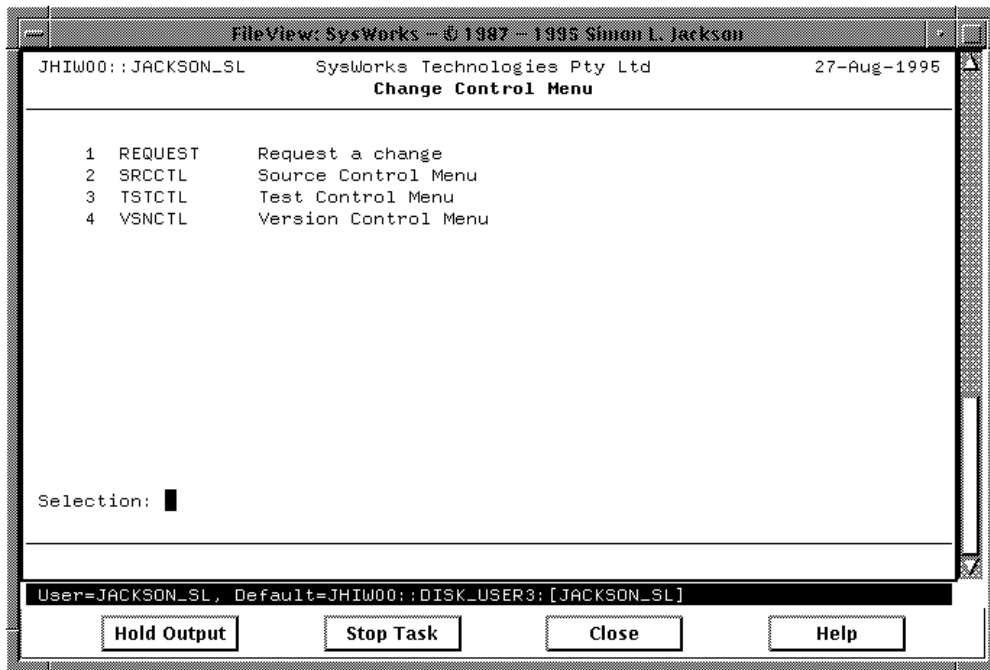
```
$ vsnctl install
Target environment [PROD]:
Execution (Batch/Detached/Online/Subprocess) [Batch]:
Batch queue [SYS$BATCH]:
Execute after [NOW]:
```

Version Control (cont)

Figure 7: Install Flow



Change Control



Language Specifics

File Types and Locations

- **Source files.**
Usually found in the work directory, but if they are generated they will be found in the library directory . Typical file types include .C, .COB, .COM_SRC, .COM_APP, .H, .FOR, .SDML, .SDML_INC and .UIL Should start with application code except for special cases. If not generated, they should reside in the CMS library.
- **Intermediate files.**
Usually found in the library directory. Typical file types include .LIBS, .MAP, OBJ and .OLB.
- **Tag files.**
Usually found in the library directory. Typical file types include .TAG_CDD, .TAG_EP, .TAG_INC_1 and .TAG_INC_2. These files are used to manage dependencies which are either inefficient or impractical to manage with direct MMS dependencies.
- **Target files.**
Usually found in the software or documentation directories. Typical file types include .COM, .EXE, .HLB, .HLP, .PS and .UID.

Language Specifics

Table 9: ACMS Application Requirements

| File Type | Feature | Semantics |
|-----------|-----------------------------------|--|
| .ADF | | ACMS application source. |
| | <code>_srv: ... server</code> | For each label ending in <code>_srv:</code> a search is made for the <i>server name</i> in <code>...</code> clause. If found, is indicated a dependency upon the associated <code>.TAG_IMG</code> tag. |
| | <code>%include ...</code> | Included source. Uses a dependency on a <code>.TAG_TRS</code> tag. |
| .ADB | | ACMS application database generated by the <code>COMPILE</code> command or the <code>BUILD DESCRIP</code> phase. |
| .MMS_INC | | Generated in the library directory by the <code>BUILD RULES</code> phase. |
| .TAG_TRS | | Used to manage dependencies required by <code>%include ...</code> statements. |
| .TAG_IMG | | Used to handle transitive dependencies to the servers used by the application. |

The logical name `appl_ACMS_REPLACE` indicates whether to execute the `.ADF` source or use an appropriate ADU command. By default, this is assumed to have a value of false.

Language Specifics

Table 10: ACMS Menu Requirements

| File Type | Feature | Semantics |
|-----------|-------------|--|
| .MDF | menu is ... | ACMS menu source. Names must also exist as .TDF sources and must either start with <i>appl_MENU</i> . or start with <i>appl</i> and finish with <i>_MNU</i> . |
| | task is ... | Names must also exist as .TDF sources and must either start with <i>appl_TASKS</i> . or start with <i>appl</i> and finish with <i>_TSK</i> . |
| .TAG_CDD | | Used to manage dependencies required by the above statements. |
| .MDB | | ACMS menu database generated by the COMPILE command or the DESCRIP BUILD phase. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

The logical name *appl_ACMS_REPLACE* indicates whether to execute the .MDF source or use an appropriate ADU command. By default, this is assumed to have a value of false.

Language Specifics

Table 11: ACMS Task Requirements

| File Type | Feature | Semantics |
|-----------|---|---|
| .TDF | use workspaces ..., use workspace ..., workspaces are ..., worksspace is ... task is ..., tasks are ... | ACMS task source. Names must also exist as .CDDL or .DDL sources and must either start with <i>appl_DICTIONARY.</i>, <i>appl_FIELDS.</i>, <i>appl_RECORDS.</i> or <i>appl_REPOSITORY.</i> start with <i>appl</i> and finish with <i>_TSK</i>. Names must also exist as .TDF sources and must either start with <i>appl_TASKS.</i> or start with <i>appl</i> and finish with <i>_TSK</i>. |
| .TAG_CDD | | Used to manage dependencies required by the above statements. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

The logical name *appl_ACMS_REPLACE* indicates whether to execute the .TDF source or use an appropriate ADU command. By default, this is assumed to have a value of false.

Language Specifics

Table 12: ACMS Task Group Requirements

| File Type | Feature | Semantics |
|-------------------------|---|---|
| .GDF | form[s] [{is are}] | ACMS task group source. A target of the form <i>app/FRM.EXE</i> with a source of <i>app/FRM.OPT</i> and .TAG_EP dependencies for each form will be generated. The <i>app/FRM.OPT</i> file should also be generated - see .OPT file type below for details. |
| | server[s] [{is are}] | A target of the form <i>server-name.TAG_IMG</i> with a source of <i>appl_GRP.TDB</i> is generated. |
| | cancel procedure | |
| | dcl process | Generates a .TAG_EP dependency as described for procedures are below. |
| | default object file | |
| | {initial initialization} procedure [is] | Generates a .TAG_EP dependency for each procedure listed. |
| | procedure [server] | |
| | image [is] | Generates a .TAG_EP dependency as described for procedures are above. |
| | procedure[s] [{is are}] | |
| | {terminal termination} procedure [is] | Names must also exist as .TDF sources and must either start with <i>appl_TASKS.</i> or start with <i>appl</i> and finish with <i>_TSK.</i> |
| task[s] [{is are}] | | |
| workspace[s] [{is are}] | Names must also exist as .CDO sources and must either start with <i>appl_RECORDS.</i> or start with <i>appl</i> and finish with <i>_REC.</i> The <i>with name</i> syntax is supported by generating a target for the alternative name based on the original name. | |

Table 13: ACMS Task Group Requirements (cont)

| File Type | Feature | Semantics |
|-----------|---------|--|
| .TAG_CDD | | Used to manage dependencies required by the above statements. |
| .TDB | | ACMS task database generated by the COMPILE command or the BUILD DESCRIP phase. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |
| .OPT | | May be generated in the library directory to build a forms shareable image with a name of <i>applFRM</i> . To use this feature, a DEVTOOLS CONVERT/GENERATE <i>appl_GRP.GDF applFRM.OPT</i> command is required. |

The logical name *appl_ACMS_REPLACE* indicates whether to execute the .GDF source or use an appropriate ADU command. By default, this is assumed to have a value of false.

Language Specifics

Table 14: C Requirements

| File Type | Feature | Semantics |
|---------------------|-------------|---|
| .C | #dictionary | C source. Used to indicate a dependency on a CDD/Repository element. If the object is a record, its name must either start with <i>appl_RECORDS.</i> or start with <i>appl</i> and finish with <i>_REC.</i> If the object is a field, its name must either start with <i>appl_FIELDS.</i> or not finish with <i>_REC.</i> |
| | #include | Used to indicate a dependency on an include (i.e. .H) source. |
| | extern | Used with a function prototype to indicate a transitive (i.e. link time) dependency on an entry point in another module. |
| | main | The presence of a <code>main</code> function indicates that this source forms the root module for an image. As a result, no dependency is generated to insert the resulting object module into the object library. |
| .H | #dictionary | C include source. See C source. |
| | #include | See C source. |
| | extern | See C source |
| .TAG_CDD | | Used to manage dependencies required by <code>#dictionary</code> statements. |
| .TAG_INC_1 | | Used to manage dependencies caused by nested <code>#include</code> statements. |
| .TAG_INC_2 | | Used to manage transitive dependencies caused by <code>extern</code> statements in <code>#include</code> sources. |
| .LIS, .OBJ | | Generated in the library directory by the <code>COMPILE</code> command or the <code>BUILD DESCRIP</code> phase. |
| <i>appl</i> OBJ.OLB | | Created in the library directory to store the resultant object module. Note that this module is not inserted if the .C source contained a <code>main</code> function. |

Table 14 (Cont.): C Requirements

| File Type | Feature | Semantics |
|------------------|----------------|---|
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 15: C++ Requirements

| File Type | Feature | Semantics |
|-------------|-------------|---|
| .CXX | | C++ source. |
| | #dictionary | Used to indicate a dependency on a CDD/Repository element. If the object is a record, its name must either start with <i>appl</i> _RECORDS. or start with <i>appl</i> and finish with _REC. If the object is a field, its name must either start with <i>appl</i> _FIELDS. or not finish with _REC. |
| | #include | Used to indicate a dependency on an include (i.e. .HXX and .IXX) source. |
| | extern | Used with a function prototype to indicate a transitive (i.e. link time) dependency on an entry point in another module. |
| | main | The presence of a <code>main</code> function indicates that this source forms the root module for an image. As a result, no dependency is generated to insert the resulting object module into the object library. |
| .HXX, .IXX | | C++ include source. |
| | #dictionary | See C++ source. |
| | #include | See C++ source. |
| | extern | See C++ source |
| .TAG_CDD | | Used to manage dependencies required by #dictionary statements. |
| .TAG_INC_1 | | Used to manage dependencies caused by nested #include statements. |
| .TAG_INC_2 | | Used to manage transitive dependencies caused by extern statements in #include sources. |
| .LIS, .OBJ | | Generated in the library directory by the COMPILE command or the BUILD DESCRIP phase. |
| applOBJ.OLB | | Created in the library directory to store the resultant object module. Note that this module is not inserted if the .C source contained a <code>main</code> function. |

Table 15 (Cont.): C++ Requirements

| File Type | Feature | Semantics |
|------------------|----------------|---|
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 16: CDD/Repository Requirements

| File Name Suffix and File Type | Feature | Semantics |
|--------------------------------------|---|---|
| _FLD.CDO | <code>define field</code> | CDD/Repository field source. Global field definition. Field names should either start with <i>appl</i>_FIELDS. or not finish with _REC. |
| _REC.CDO | <code>define field</code> <code>define record</code> | CDD/Repository record source. Local field definition. Same rules apply as for global fields. Record definition. The name must either start with <i>appl</i>_RECORDS. or start with <i>appl</i> and finish with _REC. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 17: CDD Requirements

| File Name Suffix and File Type | Feature | Semantics |
|--------------------------------------|----------------------------|--|
| _REC.CDDL, _REC.DDL | <code>define record</code> | CDD record source. Record definition. The name must either start with <i>appl</i> _RECORDS. or start with <i>appl</i> and finish with _REC. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 18: Cobol Requirements

| File Type | Feature | Semantics |
|----------------------|----------------------------------|--|
| .COB | | Cobol source. |
| | filename | Must start with application code. Should reside in the CMS library. |
| | program-id | Must be the same as the filename. |
| | copy ... | Copy in a source file. The file should reside in the work directory. |
| | copy ... from dictio- nary | Used to indicate a dependency on a CDD/Repository element. If the object is a record, its name must either start with <i>appl</i>_RECORDS. or start with <i>appl</i> and finish with _REC. If the object is a field, its name must either start with <i>appl</i>_FIELDS. or not finish with _REC. |
| | copy ... in ... | Copy a source from a library. The library should reside in the library directory. It should have a file name of <i>appl</i>/TXT.TLB. |
| | call | Used to create a transitive dependency via .TAG_EP. Called program name must be in quotes. |
| .TAG_CDD | | Used to manage dependencies required by <i>copy ... from dictionary</i> statements. |
| .TAG_CPY_ 1 | | Used to manage dependencies caused by nested <i>copy ...</i> and <i>copy ... in ...</i> statements. |
| .TAG_CPY_ 2 | | Used to manage transitive dependencies caused by <i>call</i> statements in copy files and libraries. |
| .LIS, .OBJ | | Generated in the library directory by the COMPILE command or the BUILD DESCRIP phase. |
| <i>appl</i> /OBJ.OLB | | Created in the library directory to store the resultant object module. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 19: DECforms Requirements

| File Type | Feature | Semantics |
|----------------------|--------------------------|---|
| .IFDL | | DECforms source. |
| | form | Must be the same as the filename. Should start with the application code and finish with <code>_FRM</code> . |
| | copy ... | Copy in a source file. The file should reside in the work directory. |
| | copy ... from dictionary | Used to indicate a dependency on a CDD/Repository element. If the object is a record, its name must either start with <code>appl_RECORDS</code> . or start with <code>appl</code> and finish with <code>_REC</code> . If the object is a field, its name must either start with <code>appl_FIELDS</code> . or not finish with <code>_REC</code> . |
| | copy ... in ... | Copy a source from a library. The library should reside in the library directory. It should have a file name of <code>appl/TXT.TLB</code> . |
| | call | Used to create a transitive dependency via <code>.TAG_EP</code> . Called program name must be in quotes. |
| .TAG_CDD | | Used to manage dependencies required by <code>copy ... from dictionary</code> statements. |
| .TAG_CPY_ 1 | | Used to manage dependencies caused by nested <code>copy ...</code> and <code>copy ... in ...</code> statements. |
| .TAG_CPY_ 2 | | Used to manage transitive dependencies caused by <code>call</code> statements in copy files and libraries. |
| .FORM | | DECforms intermediate binary format. |
| .LIS, .OBJ | | Generated in the library directory by the <code>COMPILE</code> command or the <code>BUILD DESCRIP</code> phase. |
| <i>appl</i> .OBJ.OLB | | Created in the library directory to store the resultant object module. |
| .MMS_INC | | Generated in the library directory by the <code>BUILD RULES</code> phase. |

Language Specifics

Table 20: Fortran Requirements

| File Type | Feature | Semantics |
|---------------------|---------|---|
| .FOR | | Fortran source. |
| .LIS, .OBJ | | Generated in the library directory by the COMPILE command or the BUILD DESCRIP phase. |
| <i>app</i> /OBJ.OLB | | Created in the library directory to store the resultant object module. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 21: Oracle Rdb Requirements

| File Name Suffix and File Type | Feature | Semantics |
|--------------------------------------|-----------|--|
| <i>_CKn</i> .SQL | | Check constraint definition. |
| <i>_DOM</i> .SQL | | Domain definition. |
| <i>_FKn</i> .SQL | | Foreign key constraint definition. |
| <i>_MAP</i> .SQL | | Storage map definition. |
| <i>_PK</i> .SQL | | Primary key constraint definition. |
| <i>_PIDX</i> .SQL | | Primary index definition. |
| <i>_RTN</i> | | Routine definition. |
| <i>_SIDXn</i> | | Secondary (alternative) index definition. |
| <i>_TBL</i> .SQL | | Table definition. |
| <i>_TRG</i> .SQL | | Trigger definition. |
| <i>_TRGR</i> .SQL | | |
| <i>_VIEW</i> .SQL | | View definition. |
| <i>_VW</i> .SQL | | |
| .SQLMOD | | Module source. |
| <i>.MMS_INC</i> | procedure | Used to create a transitive dependency via <i>.TAG_EP</i> . Generated in the library directory by the BUILD RULES phase. |

The following SQL include lists are generated in the application architecture independent library directory during the BUILD SCAN phase:

- *appl_CONSTRAINTS*.SQL
- *appl_DOMAINS*.SQL
- *appl_INDICES*.SQL

- ***appl_ROUTINES.SQL***
- ***appl_STORAGE_MAPS.SQL***
- ***appl_TABLES.SQL***
- ***appl_TRIGGERS.SQL***
- ***appl_VIEWS.SQL***

The following MMS dependency list is generated in the application architecture independent library directory during the BUILD SCAN phase:

- ***appl_SCHEMA.MMS***

Language Specifics

Table 22: TDMS Forms Requirements

| File Type | Feature | Semantics |
|-----------|---------|--|
| .FRM_TDMS | | CDD backup of TDMS form used as a source. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 23: TDMS Request Requirements

| File Type | Feature | Semantics |
|-----------|--------------------------------------|--|
| .RDF | form is ..., forms are ... | TDMS Request source. Names must also exist as .FRM_TDMS sources and must either start with <i>appl_FORMS</i> . or start with <i>appl</i> and finish with <i>_FRM</i> . |
| | record is ..., records are ... | Used to indicate a dependency on a CDD element. If the object is a record, its name must either start with <i>appl_RECORDS</i> . or start with <i>appl</i> and finish with <i>_REC</i> . If the object is a field, its name must either start with <i>appl_FIELDS</i> . or not finish with <i>_REC</i> . |
| .TAG_CDD | | Used to manage dependencies required by the above statements. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

The logical name *appl_TDMS_REPLACE* indicates whether to execute the .RDF source or use an appropriate RDU command. By default, this is assumed to have a value of false.

Language Specifics

Table 24: TDMS Request Library Requirements

| File Type | Feature | Semantics |
|-----------|---|--|
| .LDF | request is ..., re- quests are ... | TDMS request library source. Used to indicate a dependency on a TDMS request definition. Its name must either start with <i>appl_</i> REQUESTS. or start with <i>appl</i> and finish with <i>_REQ</i> . |
| .TAG_CDD | | Used to manage dependencies required by the above statements. |
| .RLB | | Generated in the software directory by the COMPILE command or the BUILD DESCRIP phase. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

The logical name *appl_TDMS_REPLACE* indicates whether to execute the .LDF source or use an appropriate RDU command. By default, this is assumed to have a value of false.

Language Specifics

Table 25: DECdocument Requirements

| File Type | Feature | Semantics |
|---|--|---|
| .SDML | <CONTENTS_FILE> | DECdocument source. See Table 26 for file name suffix conventions. Include /CONTENTS in the generated DOCUMENT command. This tag must only be used in a .SDML source - it is not recognised in a .SDML_INC include source. |
| | <EXAMPLE_FILE>, <FIGURE_FILE>, <INCLUDE> | Generate a dependency on the specified include file. |
| | <INDEX_FILE> | Include /INDEX in the generated DOCUMENT command. This tag must only be used in a .SDML source - it is not recognised in a .SDML_INC include source. |
| .SDML_INC | <EXAMPLE_FILE>, <FIGURE_FILE>, <INCLUDE> | DECdocument include source. See .SDML source. |
| .GRA | | DECdocument graphic source. |
| .INX_LIST | | Used during the creation of a master index. |
| .COM, .EPS, .HLP, .INT_ TOC, .INX, .LIS, .MAP_ LIS, .TAG_ INX, .TAG_ SDML, .TEX | | Generated in the library directory by the COMPILE command or the BUILD DESCRIP phase. |
| .DECW\$BOOK, .GIF, .HTML, .PS, .TXT | | Generated in the documentation directory by the COMPILE command or the BUILD DESCRIP phase. |
| .MMS_INC | | Generated in the library directory by the BUILD RULES phase. |

Language Specifics

Table 26: DECdocument File Name Suffices

| File Name Suffix | Usage |
|-------------------------|---|
| _CVR | Cover note source for generating PostScript and text output. |
| _GDE | Guide source for generating bookreader, master index and PostScript output. |
| _HLP | Help source. |
| _IDX | Master index sources for generating PostScript output. Two sources must exist, one with a file type of .SMDL and the other of a file type of .INX_LIST. |
| _INS | Guide source for generating bookreader, PostScript and text output. |
| _OVH | Overhead source for generating PostScript output. |
| _RELEASE_NOTES | Release notes source for generating bookreader, PostScript and .RELEASE_NOTES output. |
| _REF | Reference manual source for generating bookreader, master index and PostScript output. |