



HORIZONT

XINFO – Programming Languages z/OS – General Information

Sourcecode and Program Analysis

What is this presentation about?

This PowerPoint gives you a short overview about XINFO's source scanners for z/OS.

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AGENDA

XINFO – Programming Languages z/OS – General Information

Sourcecode and Program Analysis

XINFO and programs

XINFO Source Scanners

CALL Level

Source DB2 Access

Program Call Hierarchy

XINFO Display

XINFO and programs

XINFO offers source scanners for following programming languages:

- Assembler
- COBOL
- PL/1
- Easytrieve
- Natural
- C

In addition to source scanners XINFO provides:

- Loadmodule scanner
- Function to scan program calls (“interlanguage” calls)

XINFO Source-Scanners

The scanners are processing the sources similar to a compiler – but the output is not a load module but following information prepared for the XINFO queries:

- General Info: List with programs and its attributes – like “uses SQL”, “uses CICS commands” etc
- Includes/copybooks: information about usage of Includes/Copybook
- Calls: External program calls (also dynamic calls) as a table and also in a graphic presentation
- Files: File access (for example read/write/update) and File definitions (Names, Recsize etc)
- DB2: Which program is working on which table (Select, Insert, delete etc), down to the columnlevel
- CICS and DLI Calls and the parameters used in each call
- Global Variable Definitions and its attributes

Input for the source scanner

- PDS/PDSE-Libraries
- Librarian
- Optional compiler output (with certain restrictions)
- Ability to scan complete libraries – sources and includes/copybooks or single members by using Include/Exclude masks
- After one complete scan it is possible to work incrementally – using input lists about the new or changed programs of the same day for example

XINFO Load module-Scanner

The Load module scanner analyses load modules (binaries).

- Complete PDS/PDSE libraries with loadmodules or single member(s) through include/exclude masks
- Incremental scan is possible (for example all modules with a link date bigger than...)
- Output are two tables:
 - Attributes of the module – for example link date/time, AMODE/RMODE, RENT, REUSE, BINDER-ID etc.
 - Attributes of CSECTs, with Translator-ID, Date/Time, Size etc.

XINFO's "call" analysis

The output of the source scanners is used to analyse program calls

- Input is source scanner output
- Output are three tables:
 - Calls
 - File-Access
 - DB2-Access
- Resulting information:
 - "Call" levels are determined (Program A calls B, B calls C, XINFO shows "A calls C at level 2")
 - "Interlanguage" calls are analysed – e.g. COBOL calls C routine
 - Different development environment calls are analysed – e.g. if a test program calls a production module

CALL Level

Example “COBOL – CALL” query:

MainPGM (Calling Program)	CalledNm (Called Program)	Method / Call Parameters / Libraries and more information
MAIN01	SUB01	Call / ACTION,AREA / PROD.SRC:LIB01 / ...
SUB01	SUB02	Call / ACTION,AREA / PROD.SRC:LIB01 / ...
SUB02	SUB03	Call / ACTION,AREA / PROD.SRC:LIB01 / ...
MAIN02	SUB04	Call / ACTION, AREA / PROD.SRC.LIB01 / ...
SUB04	SUB05	Link / MSGAREA / PROD.SRC.LIB01 / ...
...

Only the direct calls
are shown – here
MAIN01 calls SUB01

Program Source Call

The same query in “Programs - Source - Call” shows a “better” result:

MainPGM (Calling PGM)	CalledNm (Called PGM)	Level	Method / Language / Libraries and more information
MAIN01	SUB01	1	call/ COB / PROD.SRC:LIB01 / ...
MAIN01	SUB02	2	call / COB / PROD.SRC.LIB01 / ...
MAIN01	SUB03	3	call / COB / PROD.SRC.LIB01 / ...
SUB01	SUB02	1	call / COB / PROD.SRC.LIB01 / ...
SUB01	SUB03	2	call / COB / PROD.SRC.LIB01 / ...
...

Here you can see ALL the CALLS that are possible to be executed from MAIN01

Source DB2 Access

Example “Cobol – DB2” query:

MainPGM (Program)	Object (Table/View)	Action / Column usage / Libraries and more information
MAIN01	MYTAB01	SELECT / ... / PROD.SRC:LIB01 / ...
SUB01	YOURTAB01	SELECT / ... / PROD.SRC.LIB01 / ...
SUB02	YOURTAB02	SELECT / ... / PROD.SRC.LIB01 / ...
MAIN02	MYTAB02	
SUB04	MYTAB03	
...

Only direct DB2 access is shown – here program MAIN01 has a “select” on MYTAB01

Programs Source DB2 Access

The same query “Programs - Source – DB2 Access” shows also DB2 access out of subprograms:

MainPGM (Calling PGM)	SubPgm (Called PGM)	Object (Table/View)	Level	Action / Column usage / Libraries and more information
MAIN01	MAIN01	MYTAB01	0	SELECT / ...
MAIN01	SUB01	YOURTAB01	1	SELECT / ...
MAIN01	SUB01	YOURTAB02	2	INSERT / ...
SUB01	SUB01	YOURTAB01	0	SELECT / ...
SUB01	SUB01	YOURTAB02	1	SELECT / ...
...		

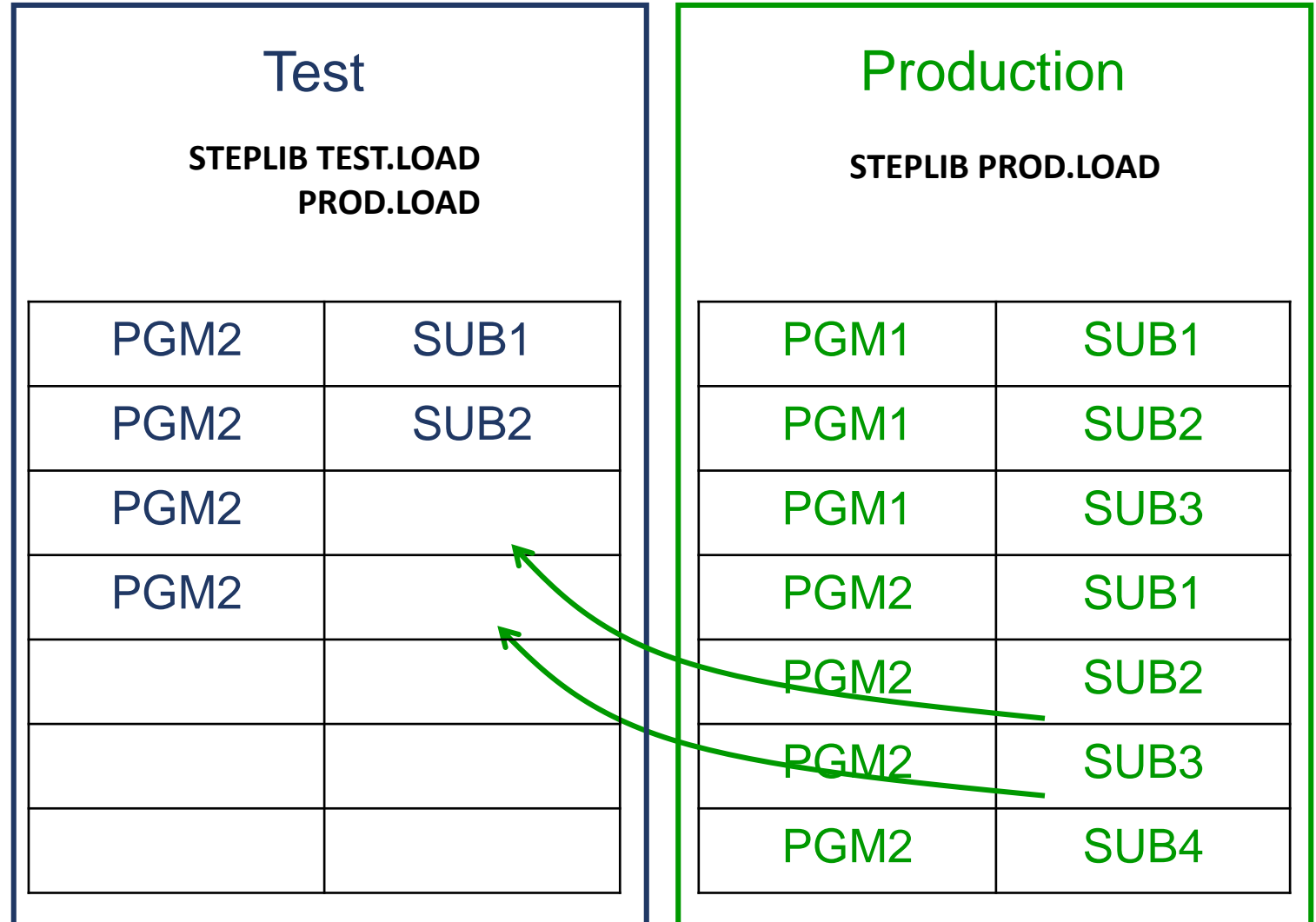
Here you can see all DB2 Objects which are processed during the execution of MAIN01

Support for multiple development environments

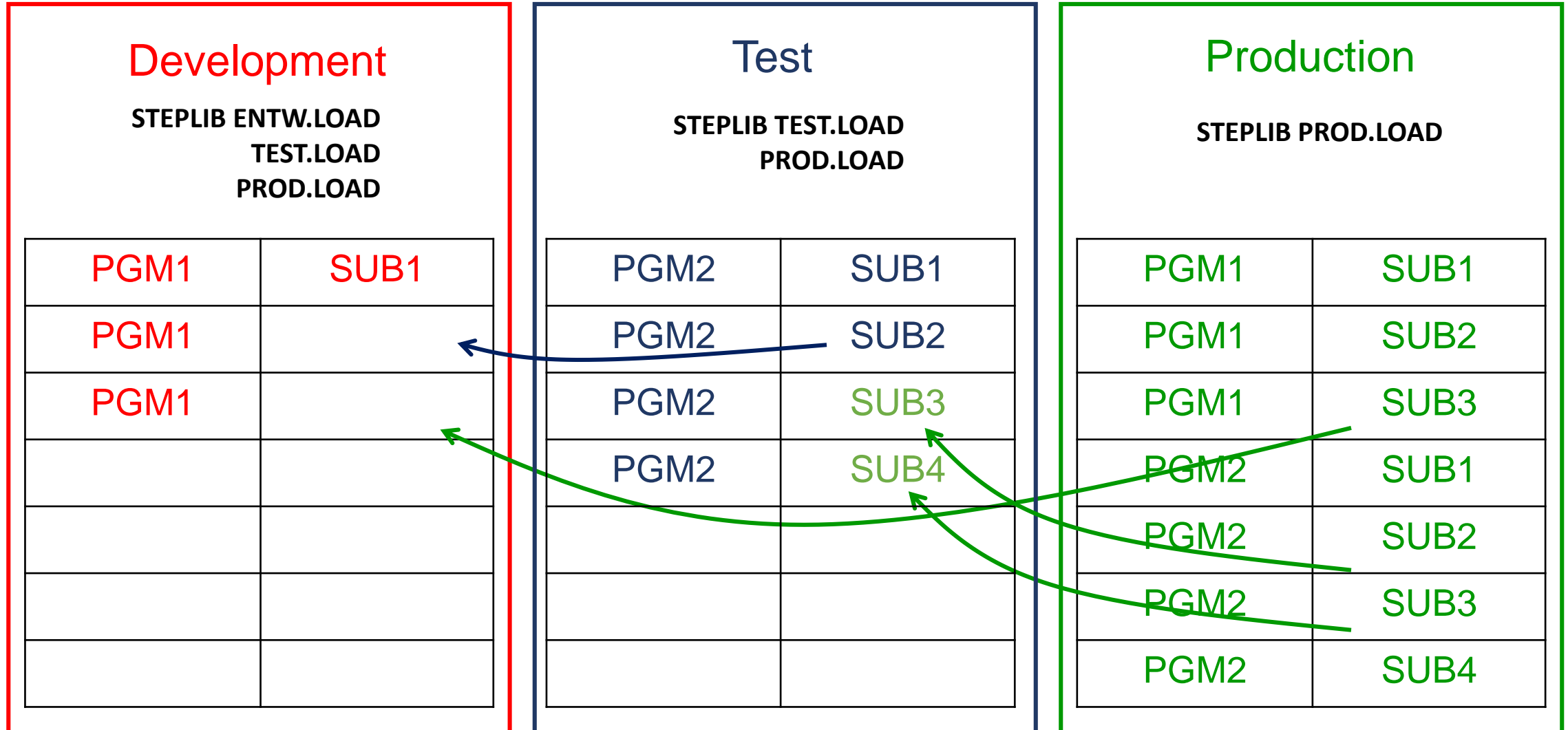
During the source analysis all existing environments can be scanned, e.g. development, test, and production.

- PRODUCTION environment can be defined with “higher“ priority as Test environment:
 - If a subprogram is NOT found in the environment, for example TEST, then a HIGHER version in PRODUCTION is shown (vice versa is of course not shown)
 - The priority of the environments has to be defined by an administrator during installation

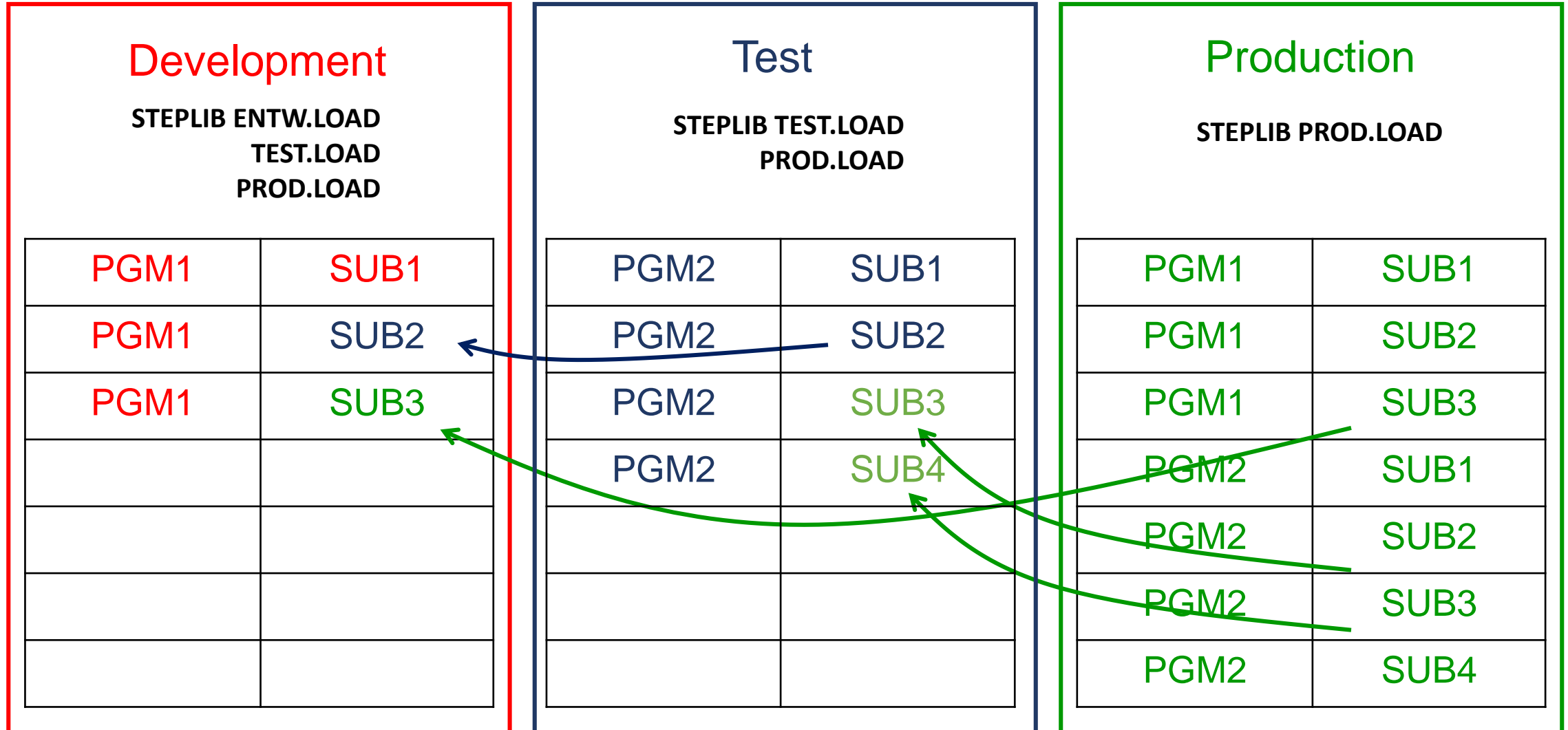
Program Calls Hierarchy



Program Calls Hierarchy



Program Calls Hierarchy



Program Calls Hierarchy

Development

STEPLIB ENTW.LOAD
TEST.LOAD
PROD.LOAD

PGM1	SUB1
PGM1	SUB2
PGM1	SUB3

Test

STEPLIB TEST.LOAD
PROD.LOAD

PGM2	SUB1
PGM2	SUB2
PGM2	SUB3
PGM2	SUB4

Production

STEPLIB PROD.LOAD

PGM1	SUB1
PGM1	SUB2
PGM1	SUB3
PGM2	SUB1
PGM2	SUB2
PGM2	SUB3
PGM2	SUB4

For each environment a source scan must be executed and corresponding KEYS need to be used (Development, Test, Production)

Program XXRIMSP

This XINFO program needs to know the concatenation of the environment in order to build the dependencies of the existing environments:

```
//XXRIMSP EXEC PGM=XXRIMSP,...
```

...

```
//SYSIN DD *
```

```
ORDER=PROD
```

```
ORDER=TEST
```

```
ORDER=DVLP
```

...

XINFO Display - Selection

The screenshot displays the XINFO PC Client interface. A dialog box titled "Programs - Source - Call" is open, allowing for the selection of program parameters. The dialog box contains the following fields:

Field	Dropdown	Text Input
MainModule	=	
MainSrcMem	=	
MainSrcLib	=	
MainLanguage	=	
SubPgm	=	
SubSrcMem	=	
SubSrcLib	=	
SubLanguage	=	
Sub-Environment	=	
SubSrc Avail. Y/N	=	
Call Level	=	
Type of Call	=	

At the bottom of the dialog box are buttons for "OK", "Actions", and "Cancel".

The background interface shows a "Workspace Tree" on the left with the following structure:

- SMF
- Space
- PO
- Output
- Programs
 - Source
 - Call
 - MQSeries Calls
 - File Accesses
 - DB2 Accesses
 - Call Chain
 - Call Diagram
 - Load Modules
 - Modules/CSects
 - Cobol Compiler Options
 - PL/I Compiler Options
- Source
- XINFO
- Universal

The status bar at the bottom indicates: "Connected as: P392e, file: XX40T#14".

XINFO Display - Result

XINFO PC Client - Programs - Source - Call

File Home Table Netplan Barchart Chart Script View Style

Programs - Source - Call

MainMod	SubPgm	Level	Method	MainSrcM	MainSrcLib	MLng	SubSrcM	SubSrcLib	SLng	Sub-Env	F
<all>	<all>	<...>	<all>	<all>	<all>	<...>	<all>	<all>	<...>	<all>	
ACAP501	ENZP261	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	ACZP136	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	ZSNAPAI	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	VPZP061	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	ACZPALU	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	ACZPACU	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB	ACZPACU	P390A.XXR.DATA.ERR16804.PGM	COB	PROD	Y
ACAP501	ACZPAVU	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP501	ACZPAPU	1	CALL	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ZLOGMED	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ZDATCH8	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	DLITCBL	1	ENTRY	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ZSPP141	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ZSNAPAI	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ZMILJO	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP344	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP319	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACAP501	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB	ACAP501	P390A.XXR.DATA.ERR16804.PGM	COB	PROD	Y
ACAP550	CBLTDLI	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP797	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP402	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ENZP261	2	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP136	2	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	VPZP061	2	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZP136	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB					N
ACAP550	ACZPACU	1	CALL	ACAP550	P390A.XXR.DATA.ERR16804.PGM	COB	ACZPACU	P390A.XXR.DATA.ERR16804.PGM	COB	PROD	Y

Environment of the sub program (PROD/TEST/DEV)

Subprogram

Main Program

Connected as: P392e, file: X401#14

Lines: 28

Thanks for your attention! Do you have any questions?

The logo for 'HORIZONT' features the word in a bold, sans-serif font. The letter 'O' is highlighted in red, while the other letters are in dark grey. The background is light grey with a large red curved shape on the left and several faint geometric shapes (squares and a triangle) scattered around the text.

HO R I Z O N T

Please feel free to visit us in Munich or send an email to
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