

# Introducing Z Abend Investigator (ZAI)

# What is Z Abend Investigator (ZAI)?

- ZAI can capture abends in the following environments:
  - z/OS
  - LE (Language Environment)
  - CICS
  - IMS
  - DB2
  - MQ Series
  - UNIX System Services
- Supports source display of the following languages:
  - COBOL, PL/I, Assembler, C/C++ and Java.
- ZAI is a tool which helps you determine the cause of an application abend
  - Enabling you to more quickly identify and resolve the problem
- Delivers information about an application when it has abended, to help you assess:
  - What happened, and why?
  - What program?
  - What line of source code?
  - What source variables were involved?

## Problem analysis steps without ZAI:

1. Capture CEEDUMP or MVS dump
2. Determine abend offset into program from dump
3. Obtain a matching compiler listing – need to make sure it really matches!
4. Using the listing, identify the matching source line for the abend offset
5. Identify data fields involved and their offsets into working storage
6. Validate the content of each data field in the dump to determine the one(s) in error
7. Fix the problem

## Problem analysis steps with ZAI:

```
Synopsis
Command ==>
JOBNAME: BATCH006  SYSTEM ABEND: 0C7  FAE1  2019/10/02  07:50:46

A system abend 0C7 occurred in module BATCH006 program BATCH006 at offset
X'248'.

A program-interruption code 0007 (Data Exception) is associated with this
abend and indicates that:

A decimal digit or sign was invalid.

The cause of the failure was program BATCH006 in module BATCH006. The COBOL
source code that immediately preceded the failure was:

Source
Line #
000148          ADD QTR1-WRIT-PREM OF WE264 TO QTR1-ENT OF WRITTEN-PREMIUM.

The COBOL source code for data fields involved in the failure:

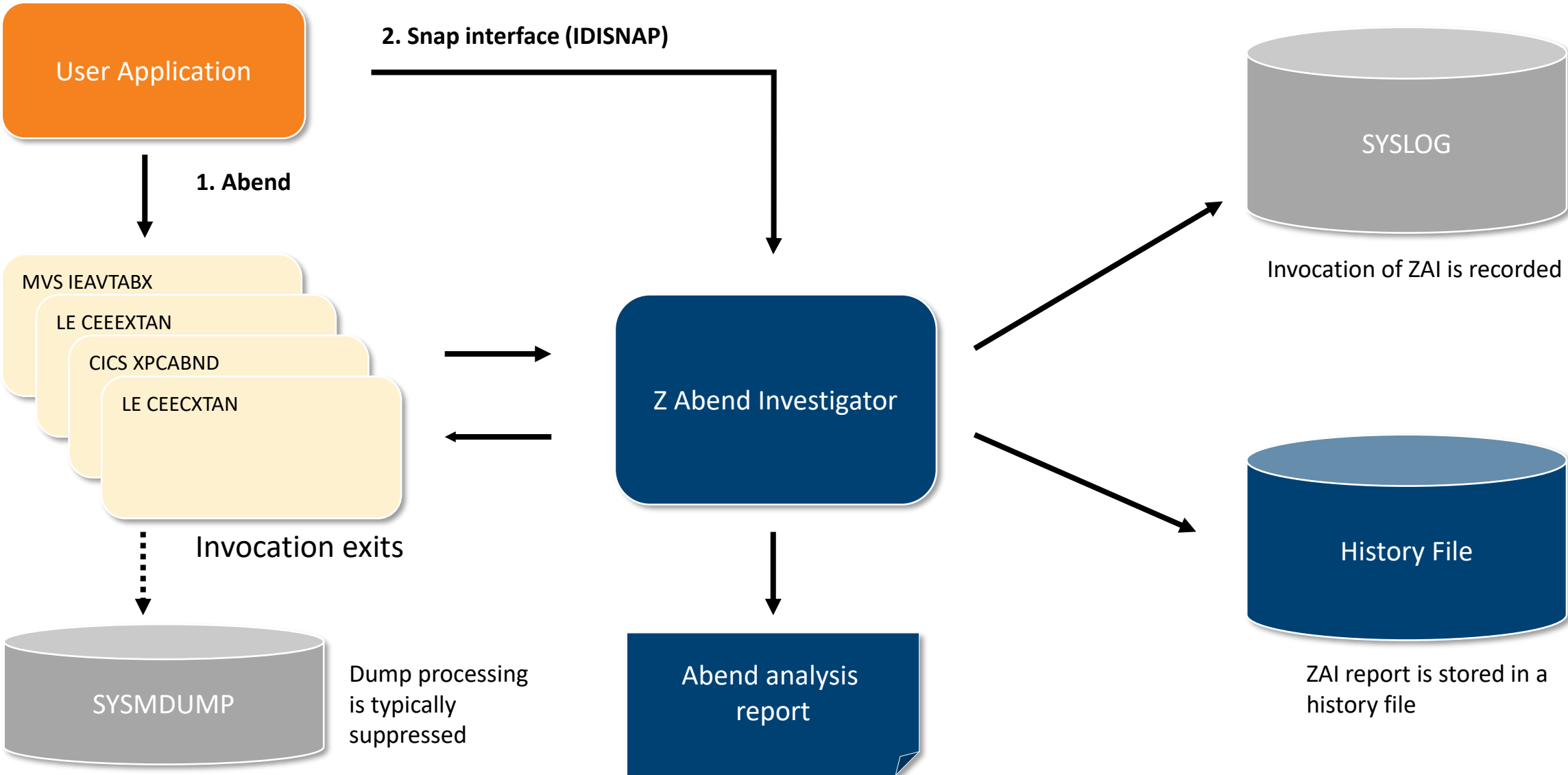
Source
Line #
000062          10 QTR1-WRIT-PREM          PIC S9(9)V99 USAGE COMP-3.
000092          05 QTR1-ENT              PIC S9(9)V99 VALUE ZEROS.

Data field values at time of abend:

QTR1-ENT OF WRITTEN-PREMIUM = 0.00+
QTR1-WRIT-PREM OF WE264    = X'0000000000000' *** Invalid numeric data ***

*** Bottom of data.
```

# How does it work?



# How to use Z Abend Investigator?

## Different modes of operation

- **Real-time analysis**
  - Captures abends in real-time and performs analysis.
  - Produces a real-time analysis report.
  - Optimized for usage in production systems with no overhead when no abend.
  - Creates a fault entry which can be analyzed in detail later with additional information (eg. Source mapping information).
- **Interactive reanalysis**
  - Possibly gather additional information by supplying additional information (eg. Compiler listing for source display).
  - View storage areas not in the real-time report.
  - Perform analysis of SYSMDUMP data set or analysis of CICS system dump.
- **Batch reanalysis**
  - Re-generate real-time report with additional information (eg. Source mapping information). Optionally overwrite the existing real-time report.

## Rich user interface allowing easy navigation of the abend report

```

APC - [24 x 80]
File Edit Settings View Communication Actions Window Help
File View Services Help

Interactive Reanalysis Report                               Line 1 Col 1 80
Command ==> _____ Scroll ==> CSR
JOBNAME: BATCH006  SYSTEM ABEND: 0C7                      FAE1      2019/10/02  07:50:46

Fault Summary:
Module BATCH006, program BATCH006, source line # 148 : Abend S0C7 (Data
Exception).

Select one of the following options to access further fault information:
  1. Synopsis
  2. Event Summary
  3. Open Files
  4. Storage Areas
  5. Messages
  6. Language Environment Heap Analysis
  7. Abend Job Information
  8. Options

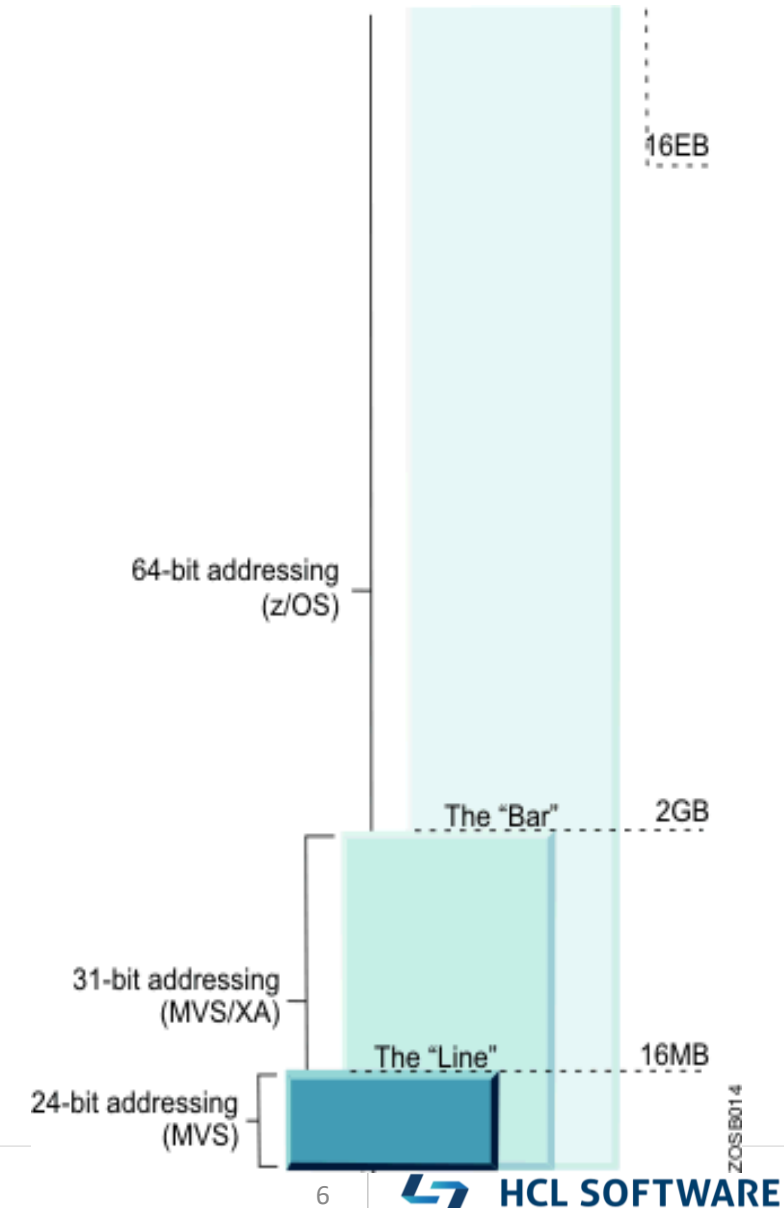
*** Bottom of data.
F1=Help    F3=Exit    F4=Dsect    F5=RptFind  F6=Actions  F7=Up
F8=Down    F10=Left   F11=Right
*FAULTA

MA C 04/015
Connected to remote server/host 10.134.49.162 using lu/pool TCPS1178 and port 23

```

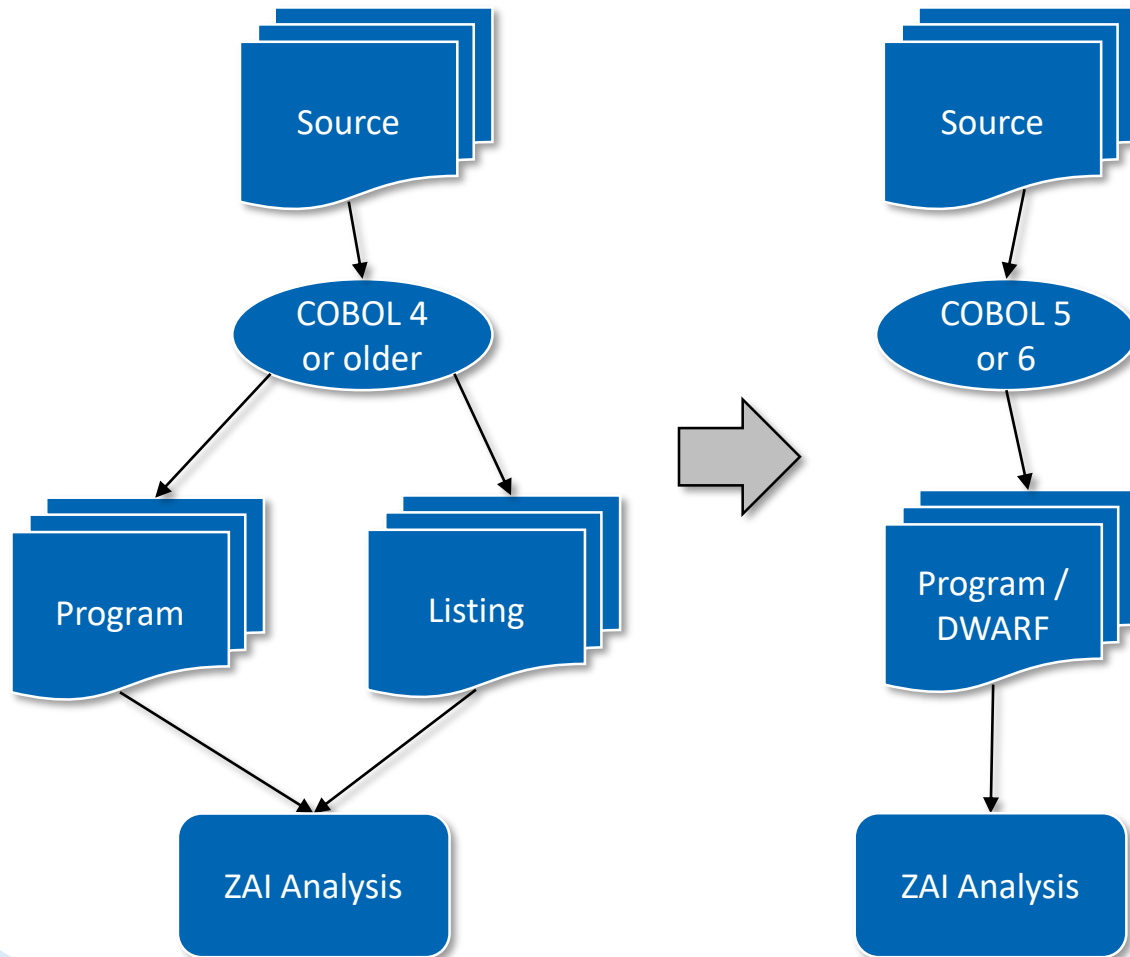
# Problem determination of 64-bit programs

- Enhanced to provide abend analysis of programs running in AMODE 64.
- Side file processing is enhanced to support Enterprise PL/I programs compiled with LP64 compile option.
- The problem analysis report remains consistent for 64-bit programs to ensure all users are able to take advantage of the enhancement immediately when abends occur in your new 64-bit programs.
- The product infrastructure is enhanced to ensure that existing features of Fault Entry space management are not affected by large Fault Entries generated as a result of large application storage areas residing in 64-bit storage.
- Fault Analyzer is also enhanced to support analysis of abending High-Level Assembler programs running in AMODE 64 and Java program errors, exceptions and abends occurring in 64-bit Java Virtual Machine.



# Exploitation of z/OS compiler technology

## No more missing compiler side files during problem analysis



## Provides support for Automatic Binary Optimizer for z/OS

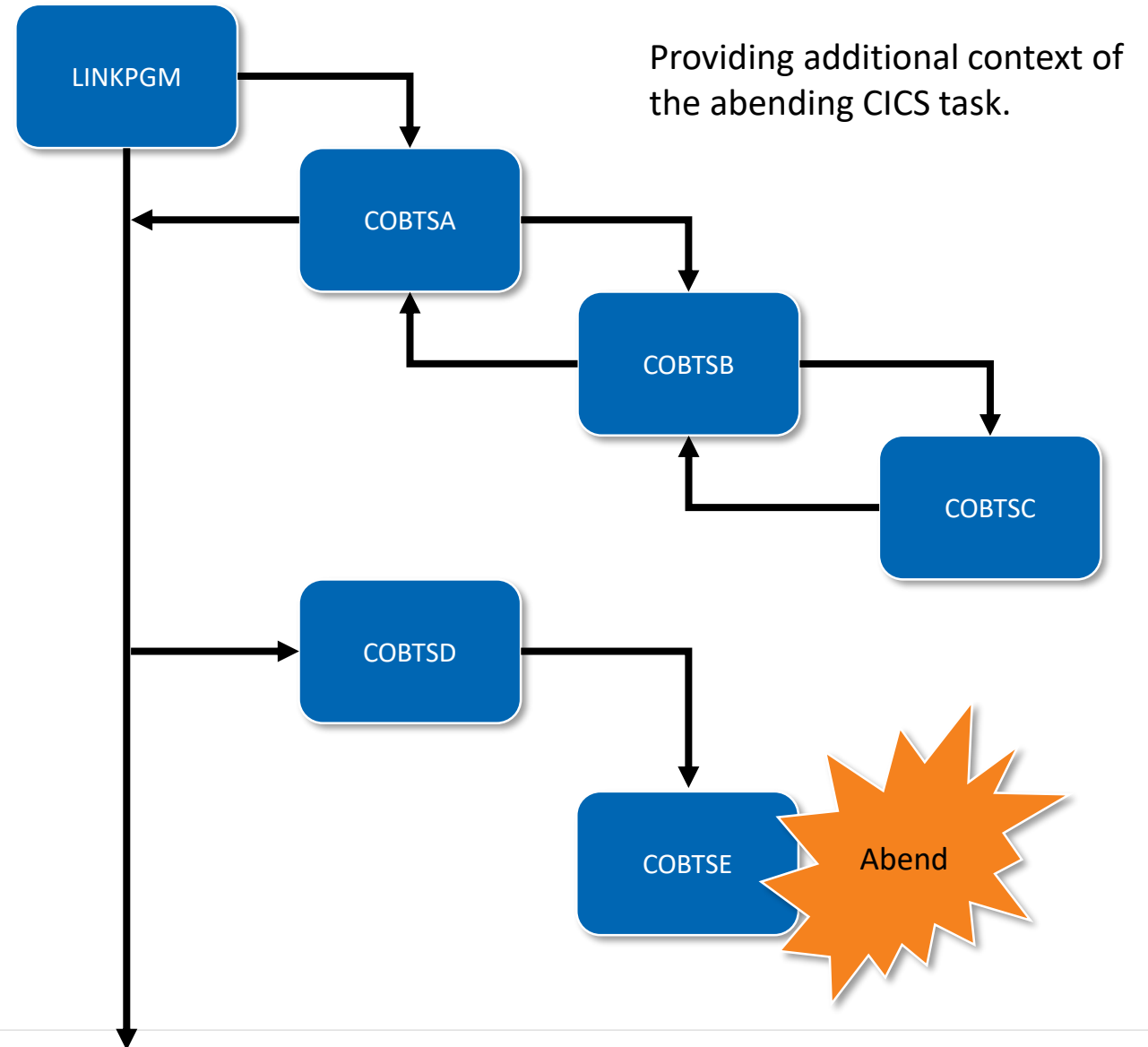
- Automatic Binary Optimizer for z/OS (ABO) optimizes COBOL binary programs to the target hardware platform without re-compiling the source files.
- Z Abend Investigator (ZAI) provides an utility to transform the original compiler listing with the output from ABO to ensure ZAI can report abend analysis of optimized programs using the source display of the original abending program.

## Reporting compiler information for the abending program

- As part of event summary information ZAI provides, compiler and its options used to create the program is reported.
- This information is useful to ensure optimal programs are produced for your target system's hardware level.

# Improve CICS problem diagnosis

```
File View Services Help
Internal CICS Trace Link Analysis
Command ==>
Full Application Only - TRANID: AS01 CICS ABEND: COBT
-> LINK LINKPGM
-> LINK COBTSA
  -> LINK COBTSA
    -> LINK COBTSA
      -> LINK COBTSC
      -> RETURN COBTSC
    -> RETURN COBTSA
  -> RETURN COBTSA
-> LINK COBTSD
  -> LINK COBTSE
  -> *** ABEND COBT ***
  -> PERCOLATE COBTSE
```





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