Typical z/OS problems are classified by the following symptoms:

- Abend – an error or abnormal end of a program or job.
- Wait or Hang – a coded wait state is loaded into the system or a job appears hung or does not complete.
- Loop – the system or program executes indefinitely typically using large or higher amounts of processor resource.
- Incorrect output – there is incorrect output being produced by a program or job.
- Performance – processing is using too much system resource and impacting other parts or users of the system, processes are taking too long etc.
- Message – an error message is posted through a message to the operator or in a log.

> PSIs is the determination of what caused the error based on answering these questions:

1. When an error occurs, z/OS provides various forms of diagnosis information that contains symptoms. These symptoms can help you with diagnosis. This be used in problem source identification (PSI).
2. PSIs is the determination of what caused the error based on answering these questions:
3. Why was the abend code?
4. What is the failing module or CSSCT?
5. What components or products were involved with the error?

To diagnose a z/OS problem, follow these steps:
1. When the problem occurs, gather all the available diagnosis information for the problem. This might include your installation internal problem tracking external symptoms, what might have triggered the problem, and what was done to recover, including the following types of diagnosis information such as:
   - Hardware involved
   - System and application level symptoms
   - External symptoms
   - Problem impact
2. Diagnostic data produced
   - NOTE: Provide sufficient information during the first call to IBM or the individual software vendor, you might avoid having to re-create the problem.
3. To diagnose a z/OS problem, follow these steps:
4. Problem type
   - Indicator
   - System action
   - System programmer action

### Problem type

#### Job Hang / Wait or Loop

- Indicator
- System action
- System programmer action

<table>
<thead>
<tr>
<th>Problem type</th>
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<th>System action</th>
<th>System programmer action</th>
</tr>
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<tbody>
<tr>
<td>Job Hang / Wait or Loop</td>
<td>Job does not end, no further output is produced, and the job can or cannot be CANCELLED or FORCED</td>
<td>No response</td>
<td>Use the DUMP command to obtain an SVC dump of the hang job. If the DUMP is not successful, consider taking a stand-alone dump.</td>
</tr>
</tbody>
</table>

#### SYSTEM HANG or Wait

- Indicator
- System action
- PSIs are used to identify the root cause of the problem. PSIs is useful even if the root cause of the problem is not identified.

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### Problem type

#### Loop

- Indicator
- System action
- System programmer action

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<tr>
<td>Loop</td>
<td>High processor resource being consumed looking for output work. Excessive spin detected with III/781 or ABEND/701 issued, both.</td>
<td>No response</td>
<td>Use an online monitor, such as RMF or IBM OMEGAMON, z/OS Management Console, to determine whether the problem originates from a high priority job in normal processing or from a problem.</td>
</tr>
</tbody>
</table>

#### Enabled Wait or Performance degradation?

- Indicator
- System action
- System programmer action

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<th>System programmer action</th>
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<tbody>
<tr>
<td>Enabled Wait or Performance degradation?</td>
<td>Job output is missing or processing is incorrect.</td>
<td>Processing continues</td>
<td>Use GTF or SLIP to trace input and output.</td>
</tr>
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#### Output problem

- Indicator
- System action
- System programmer action

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<td>Output problem</td>
<td>Job output is missing or processing is incorrect.</td>
<td>Processing continues</td>
<td>Use GTF or SLIP to trace input and output.</td>
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#### After the problem type is identified, see diagnosis procedures to identify the source and extract symptoms.

1. Abends have an associated system completion code to describe the error and must have a reason code to further explain the problem. These codes can be found by searching:

2. **LookAt**
   - Highlighted in the following:
     - Problem type
     - PSIs are used to identify the root cause of the problem. PSIs is useful even if the root cause of the problem is not identified.
     - PSIs is the determination of what caused the error based on answering these questions:
       1. When an error occurs, z/OS provides various forms of diagnosis information that contains symptoms. These symptoms can help you with diagnosis. This be used in problem source identification (PSI).
       2. PSIs is the determination of what caused the error based on answering these questions:
       3. Why was the abend code?
       4. What is the failing module or CSSCT?
       5. What components or products were involved with the error?

2.2. **z/OS MVS System Codes (i.e. SA22-7631:** note: Depending on msg. prefix; there are several volumes)

2.2. **The documentation for the particular application that failed,** for example:

   - For Language Environment completion codes, see z/OS Language Environment Run-Time Messages (SA22-7566-11).
   - The messages also contain a symbolic feedback code, which represents the first 8 bytes of a 12-byte condition token. You can think of the symbolic feedback code as the k-name for a condition. As such, the symbolic feedback code can be user-in-used, what HPL character translate to a given name, even if it occurs at different locations in an application. The messages in this category contain alphabetic suffixes that have the following meaning:
     - I: Informational message
     - W: Warning message
     - E: Error message
     - S: Severe error message
     - C: Critical error message
   - For RMF completion codes, see z/OS RMF Messages and Codes (SC33-7993).
   - Lists all messages issued by the RMF control session, Monitor I, II and III reporter sessions, and the Postprocessor. The messages are sorted by the hexadecimal message number which follows the ERB-prefix, ERB1001L continued
A hang during IPL or system initialization
No response occurs on the user's or system operator's console.
The program status word (PSW) contains X'070E0000 0 00000000'.
After a stand-alone dump is taken, because the system cannot resume usual processing, the IPL is of the stand-alone dump instead of z/OS. The stand-alone dump program or the operator can also request an SVC dump when diagnostic dump data is needed to solve a problem.
If you have previously used the TRSMAIN utility (see
Complete details are found in SNAP dump in
A user code in the form of a four decimal digits, possibly with a four byte reason code. For example, ABENDU4094. A user code is issued using the
3. SYSUDUMP – The smallest of the ABEND dumps, containing data and areas only about the failing program.
Reviewing critical messages in the log, analyzing contention, examining address spaces with high central processing unit (CPU) usage, looking for an address space dump program to dump the failed stand-alone dump program.
No work wait
CBFORMAT CVT
Example: Determining the wait state code: In the following PSW, the wait state code is X'014' and the processor that has
An abend is classified as follows:
- Software-detected: conformance problems.
- Hardware-detected: an error that precludes the system from proceeding.

Example: an application running in store key 1 requires store key assignment to key 0. The difference in store key causes a protection exception. This exception results in hardware presenting a program interruption code of 0004 to the operating system, which is externalized as ABEND004. (See SG24-8365 Introduction To The New Mainframe: z/OS Basics for explanation of PSW and store keys)