Introduction to OpenVMS AST Programming

Session 435

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Room 504

Compaq Enterprise Symposium 2000
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Agenda –

- **This session will teach you how to use OpenVMS ASTs**
- **The rules presented here ARE stricter than many of the rules presented in COMPAQ manuals.**
- **These rules are designed to ensure correct, efficient applications.**

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Introduction

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Basics

- **Synchronization roughly equivalent to IPL level synchronization in the VMS Executive.**
- **High Efficiency**
- **Fewer limits than Event Flags**

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When Should You Use ASTs?

Realtime Applications

Control

Transaction Processing

Monitoring

Terminal Applications

Network Applications

Time related applications

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General AST Concepts

- **Non-interruptable by other ASTs at same or lesser Access Modes.**
- **FIFO Execution.**
- **AST Entry is via an asynchronous(!), simulated, CALLS instruction.**

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Typical Event Driven Computer Applications

- **Printing**
- **Terminal Management**
- **Process Control**

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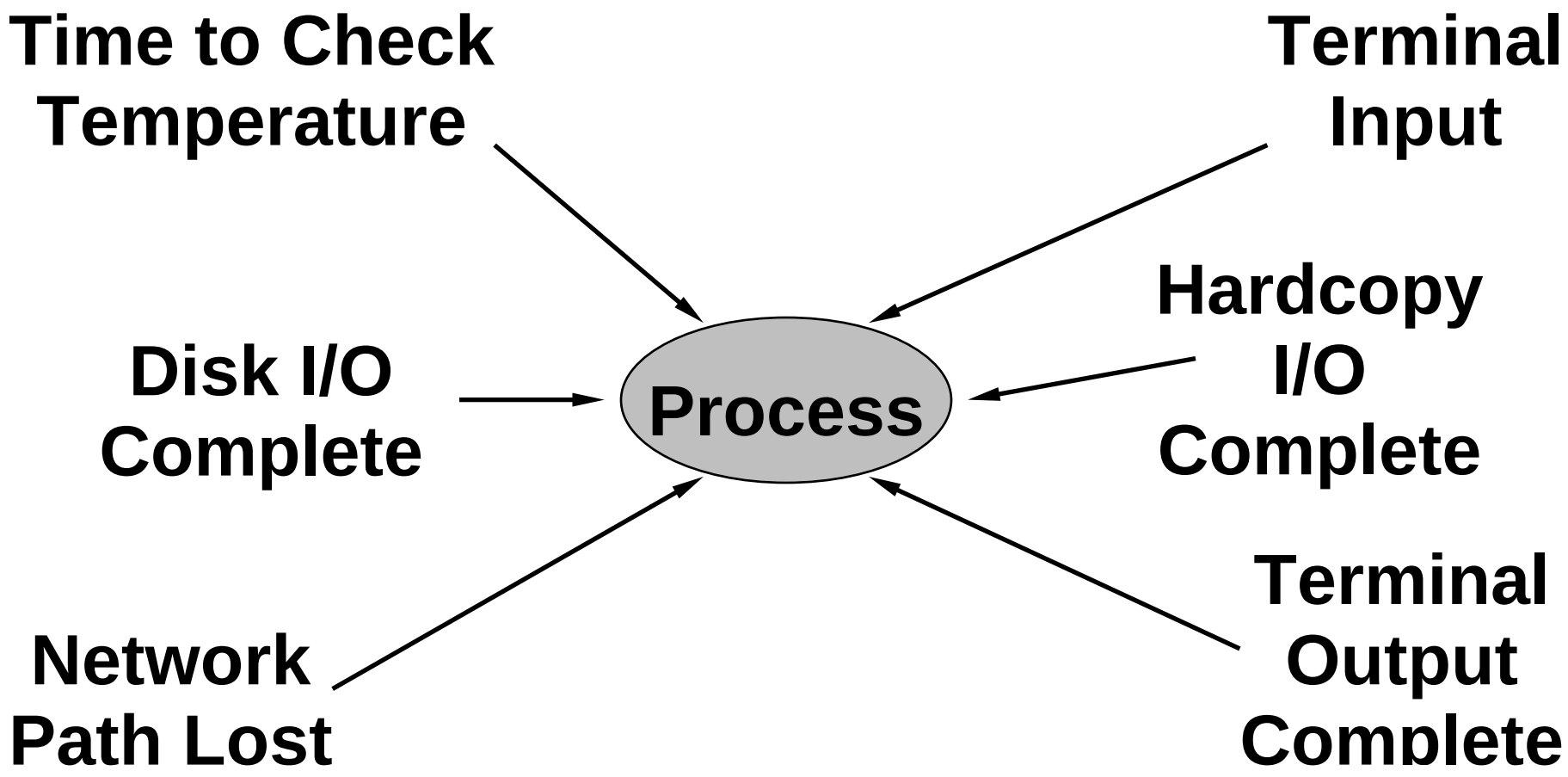
Typical Event Driven Computer Applications



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Common Root —

- **External events control program**
- **Programs need to be efficient**
- **External event sequence is not under program control**
- **No Dispatch Routine**

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Generating and Processing ASTs

- **Asynchronous System Services**
  - **$QIO**
  - **$ENQ**
- **Record Management Services**
- **Timer Services ($TIMER)**
- **Declare AST Service ($DCLAST)**
- **Mailboxes**
- **Unsolicited I/O Events**

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Programming Benefits

- **Event Flags are limited**
  - **64 Local Event Flags**
  - **64 Common Event Flags (remappable)**
- **No limit on ASTs. AST limits enforced by**
  - **ASTLIM (from SYSUAF)**
  - **System Resources**
- **Capable of supporting multiple, alternative sequences without polling or increases in complexity**

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Keep Programs Simple

Best main program for AST based application is extremely simple.

```
PARAMETER NO = 0
CALL INIT
EXIT_FLAG = NO
DO WHILE EXIT_FLAG .EQ. NO
    CALL SYS$HIBER()
    END DO
```


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Keep Programs Simple

- **Get in — GET OUT!**
- **Never use System Service WAIT forms**
- **Keep Logic simple**

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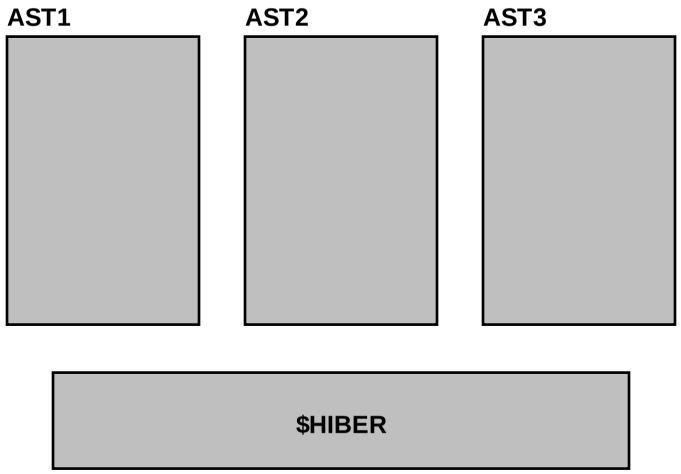
Tricks to Getting It Right

Do ALL Processing in ASTs.
Avoid Performing Processing at AST level and normal Process level.



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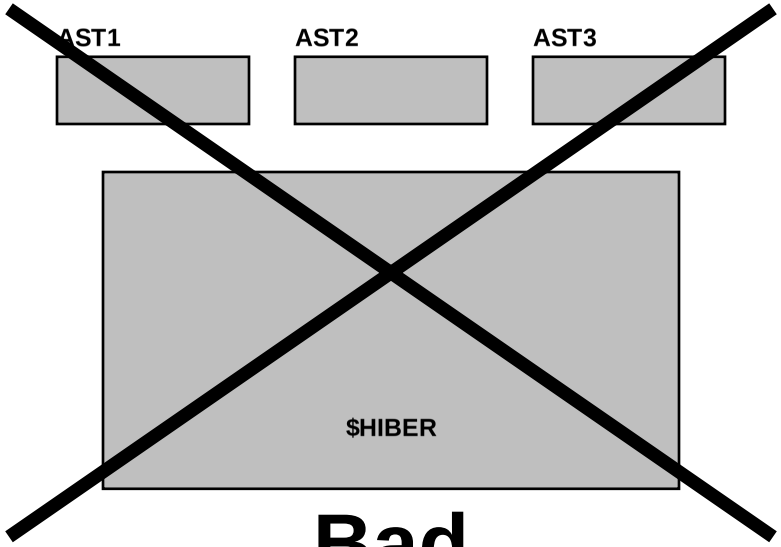

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Tricks to Getting It Right

Some packages (e.g. RDB) expect to be used only from normal level, NOT AST level.

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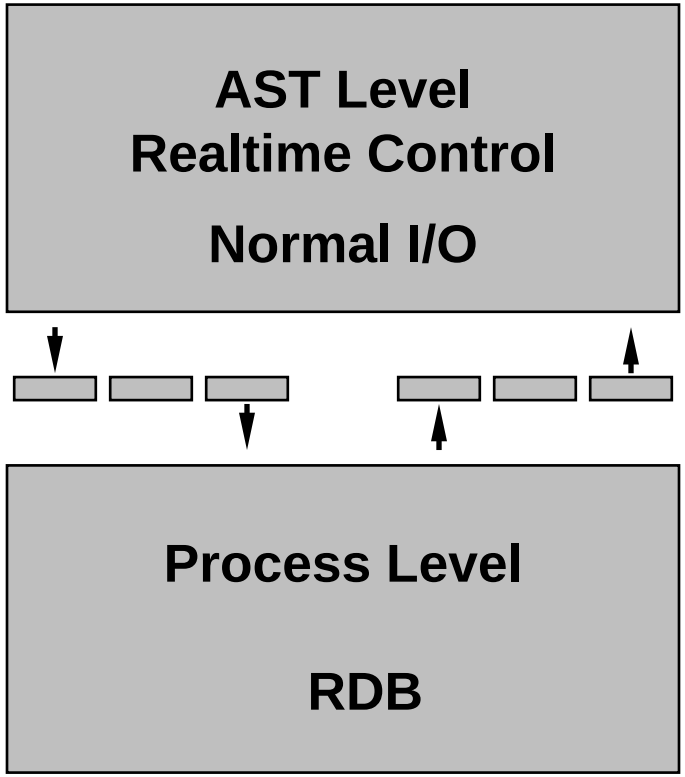
Tricks to Getting It Right

Use Work, Answer, and Free Queues to communicate.



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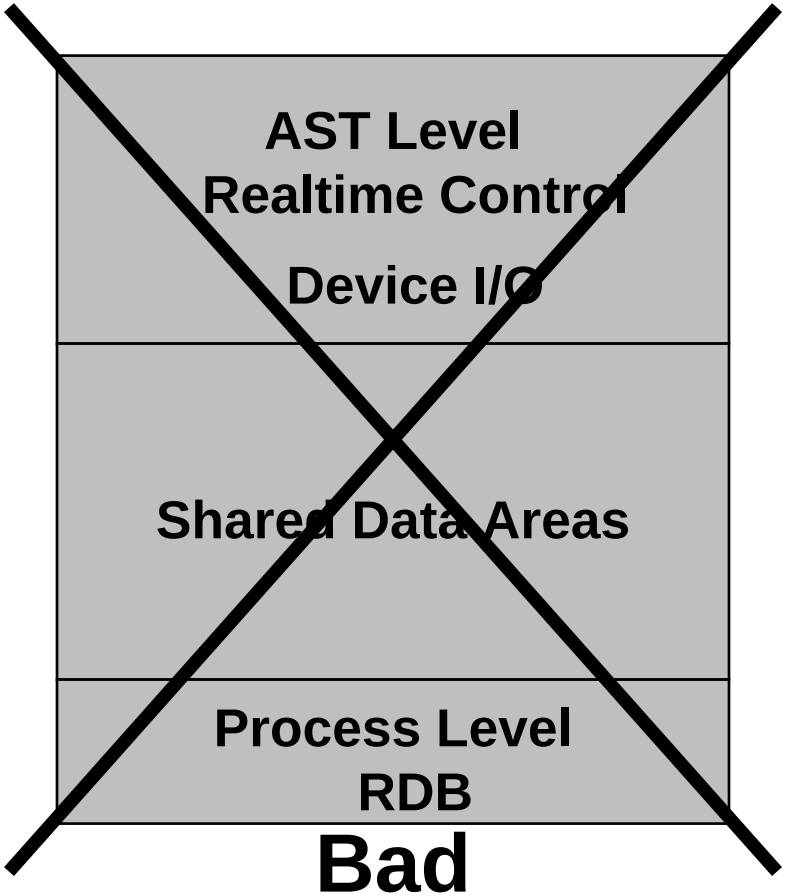

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Communications Between AST Level and Process Level

- **Use Queues, Insert/Remove Queue or LIB$ routines (for HLLs)**
- **Be careful of queue overflows, handle overflows gracefully**
- **Remember to ALWAYS issue $WAKE call!**

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Communications Between Process Leve and AST Level

- **Use queues, Insert/Remove Queue or LIB$ routines (HLLs)**
- **Use $DCLAST service to switch to AST level**
- **Allow ASTs to be processed in the order they are generated, DO NOT process multiple items at a time!**

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Initialization

Do as much initialization as possible from AST level to reduce risk of race conditions.

```
SUBROUTINE INIT
X = SYS$DCLAST(INITAST, PARM)
END

SUBROUTINE INITAST(PARM)
     .
     .
END
```

Good

```
SUBROUTINE INIT
     .
     .
END
```

Bad

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Avoid Problems

- **Kill bugs before they occur**
- **DO NOT inhibit ASTs.**
  Use $DCLAST to avoid interruptions.

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Questions?

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Session Notes & Materials:
http://www.rlgsc.com/cets/2000/index.html