

Structure Charts

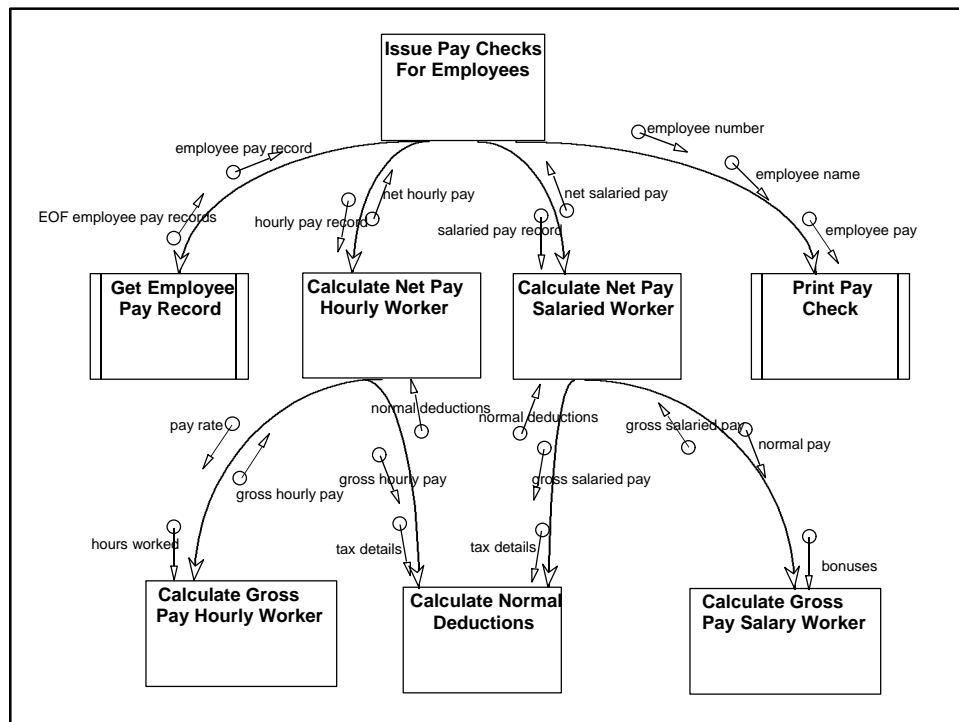
Problem Partitioning (Decomposition)

How do you fit five elephants into a Volkswagen?

- Two in the front and three in the back.

How do you produce pay checks for employees?

- Get employee pay records
- Calculate gross pay
- Calculate deductions
- Calculate net pay
- Print pay check

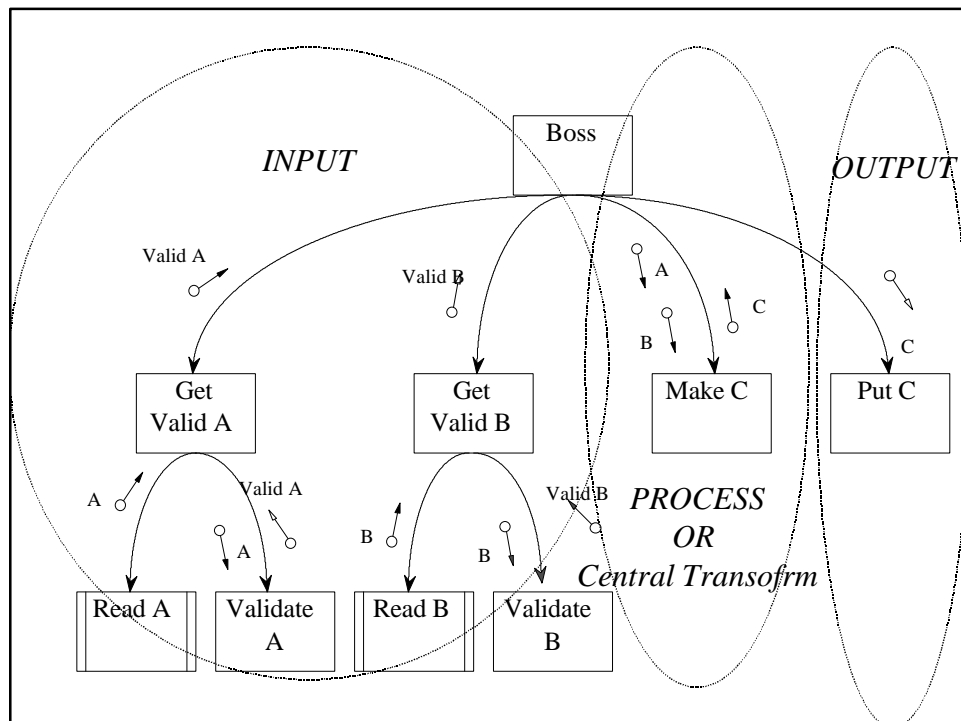


Modules

- A relatively small unit of a system that is defined by its function
- Self-contained
- Executed as units
- In most cases, a single point of entry and a single point of exit
- Programming Language Examples
 - COBOL sections, paragraphs, or subprograms
 - Subroutines in BASIC or ORTRANC: function
 - Methods in Object Language such as C++
 - Procedures in PASCAL

Modules are small systems,
containing own IPO

- Input: what it gets from its caller
- Output: what it returns to its caller
- Process:
 - Function: what it does to its input
 - Mechanics: the procedural code or logic by which it carries out its function
 - Data: its own private workspace, data to which it alone refers



Module name: calculate new balance

Receive: currentbalance, newcharges, amountpaid, EOF

Return: newbalance, status

Set newbalance, status to 0

Read currentbalance, newcharge, amoungpaid, EOF

Repeat

 newbalance = currentbalance + newcharge - amountpaid

 if newbalance < 0

 then status = 1

 else if newbalance = 0

 then status = 2

 else status = 3

 endif

endif

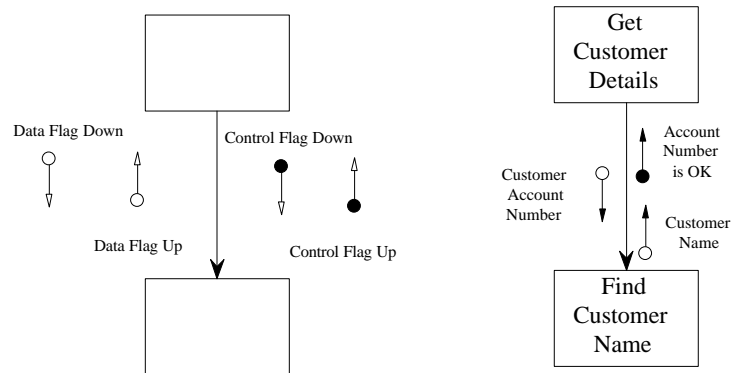
return newbalance, status

until EOF = yes

Guidelines

- A single coordinating model at the root
- Middle level modules act as coordinating modules for lowest level models but may perform some processing as well.
- Module name should concisely and accurately reflect the function.
- Conjunctions in the name: maybe multiple modules
- Sequenced mostly left to right
- Modules communicate with each other through passing parameters.

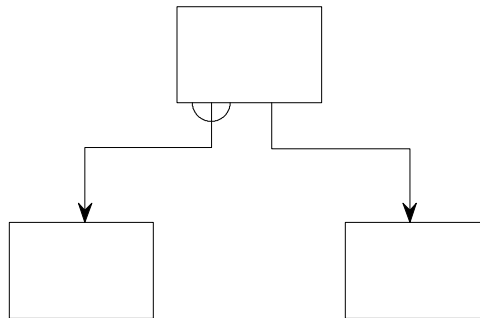
Passing Parameters



Control Flag and Data Couple

- Both of these are passing parameters
- Data Couple shows data being exchanged between two modules
- A data couple is processed
- Example: customer name, etc
- A flag shows control data, or a message, being passed between modules.
- A flag is never processed
- Example: eof, value out of range

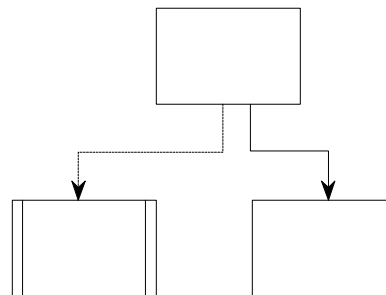
Iterative Call



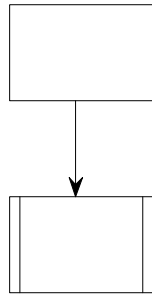
- A modules subordinates are called over and over again until some terminal condition
- Ex: Read until EOF

Asynchronous Call

- Control is not passed to the called subordinates
- Trigger a subordinate and boss go back to his work
- Example
 - police dispatch
 - background printing

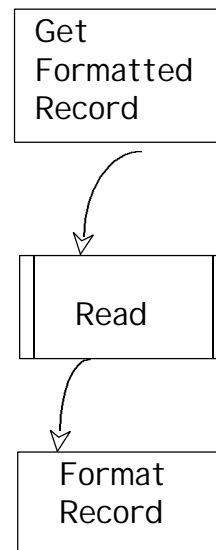


Predefined Module / Library Module



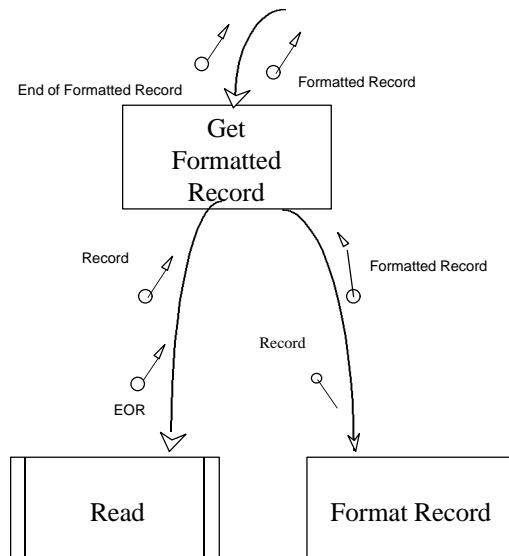
- Maybe part of the OS
- Maybe part of the compiler library
- Maybe some piece of hardware
- In general, no further subordinates

What's Wrong with this segment of a Structure Chart?

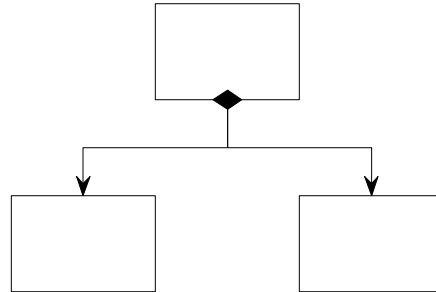


- Data couples or control flags are missing
- Higher module name must summarize functions of lower modules: “get formatted record” is “read”, and “read” is “format a record”? -- No: “get formatted record” is consisted of “read” and “format a record”.
- A predefined module is not supposed to have any subordinates. It is already defined in the library.

Corrected Version

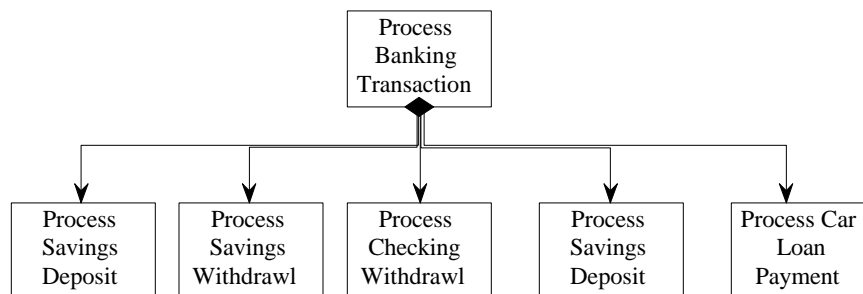


Transaction Center (Conditional Call)



- Only one sub-module will be called
- Diamond indicates a conditional statement in the boss module's code
- Ex: Bank Transactions

Transaction Center



- Primary function is to send data to their proper destinations
- Transaction center may be called "Dispatch"