

Mathematical Definition of Factorial

$$n! = \begin{cases} 1 & , \text{ for } i = 0 \\ n * (n-1)! & , \text{ for } i > 0 \end{cases}$$

FACT0010

Necessary Characteristics for Using Recursion

- 1. Problem solution can be expressed as a "smaller" version of itself.*
- 2. Stopping case – At least one (often trivial) case can be computed non-recursively.*

FACT0020

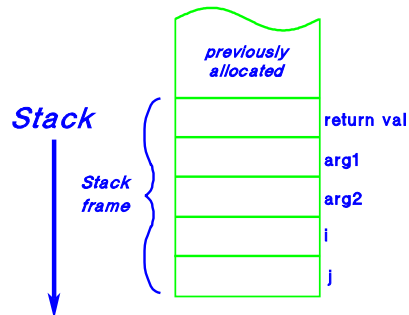
C++ Implementation of Recursion

1. When a subroutine is invoked, storage for arguments and local variables is allocated in a memory area called an "activation record"
2. Activation records are stored on the "stack."
3. Upon return, activation record is deallocated.
4. Activation record is also called a "stack frame"

FACT0030

Example of an Activation Record

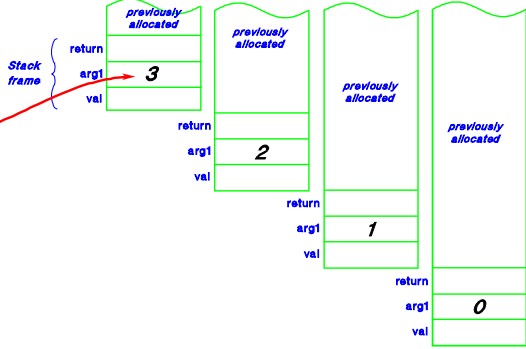
```
int func1 (int arg1, int arg2)
{
    int i, j;
    .
    .
    .
    return(j);
}
```



FACT0040

Recursion Example

```
void main()  
{  
  int i = 3, j;  
  .  
  .  
  j = fact(i);  
  .  
} //END main  
  
int fact (int arg1)  
{  
  int val;  
  if(arg1 <= 0)  
    val = 1;  
  else  
    val = arg1 *  
           fact(arg1-1);  
  return val;  
} // end fact
```



FACT0050