

Project 1: Variant of Leader Election on a Ring Topology

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Description

This ring communication example will send two values through several processes until they get back to the first process of rank 0. Each process generates a random value that can either be even or odd. The program keeps track of "president" and "vice" values which are the largest even value and the largest odd value respectively. The program compares both values at each rank and swaps one if it is greater than the current president or vice. The last two values received back to process 0 will be the greatest odd and even values from all of the processes.

Design implementation

Process of rank 0 generates a random number from 10-99. Two numbers are added before it to represent the rank.

Example: Process of rank 5 generates a random number of 25.

Value assigned to rank 5 is 1525.

As the even and odd values get passed on to each process, the value being compared are the last two digits. So, we consider $1151 > 1531$ because $51 > 31$.

Example: Process of rank 3 receives 1181 and 1214.

Process of rank 3 generates a random number of 1321.

Process of rank 3 sends 1181 and 1214 to next process.

Pseudocode

```
/* This program sends the maximum odd/even value in a ring-like fashion.
 * Each rank receives two values and depending on whether or not the RNG
 * token is odd or even, the process sends it's values to the next process.
 * This repeats for every non-zero rank until we get back to rank 0.
 * Constraints: The value must be from 10-100.
 *             The number of ranks will be from 6-20.
 */
```

```

// Initialization
Create process with N ranks
number = new Random Number
number = '1' + rank + number

// Passing values between ranks
if rank != 0
    receive values
    print values

    create random token value for each rank

    print token value

    if is max even:
        set value as president

    if is max odd:
        set value as vice

else
    create random token value for each rank
    if is even:
        set value as president

    if is odd:
        set value as vice
    print process 0 token value

send president and vice to next process
// REPEAT FOR OTHER RANKS

//final step
if rank == 0
    receive president and vice values
    print president and vice values
    if is max even:

```

```
    set value as president
```

```
if is max odd:
```

```
    set value as vice
```

```
print president and vice values
```

```
print president/vice processes
```