The background of the image is a pixelated landscape. It features several palm trees in the foreground and middle ground. In the distance, there are green hills and mountains under a blue sky with white clouds.

Ramos Gómez Elisa

Santillan Zaragoza Erick Ignacio

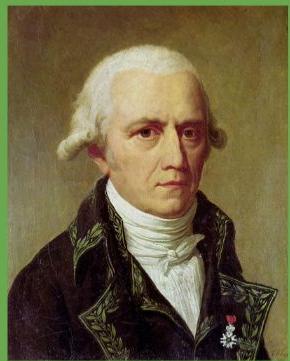
ISLAND MODELS

Martínez Alfaro Felipe de Jesús

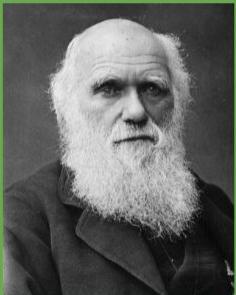
Vargas Romero Erick Efrain



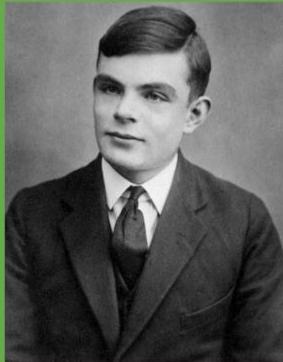
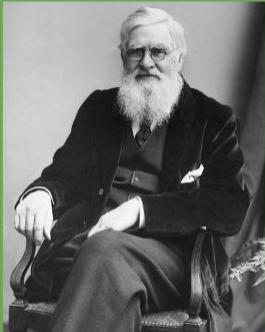
Context



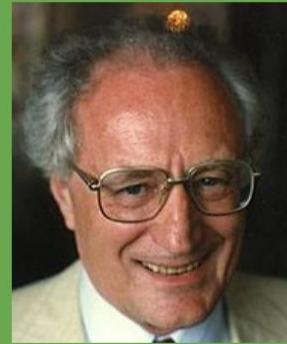
Lamarck 1802



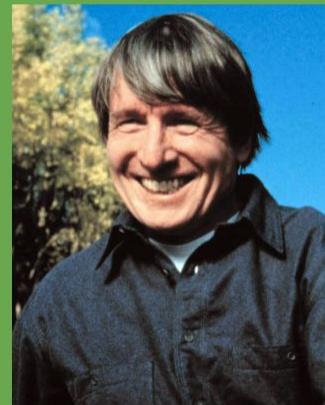
Darwin
1850's-1860's
Wallace



Alan Turing
1950



Hans J. Bremermann
1970's
John H. Holland





In 1989, Axcelis, Inc. launched Evolver, the first commercial AG product for desktop computers.

General Electric manufactures the first genetic product which is a mainframe-based toolbox for industrial processes.



Evolver

Evolver- Model

Optimization Goal

Maximum

Cell

I11

Analysis Type

 Standard Efficient Frontier

Adjustable Cell Ranges

| | Minimum | Range | Maximum | Values | Add... |
|--|---------|---------------------------------|----------------------------------|--------------------------------|------------------------|
| <input checked="" type="checkbox"/> Recipe: Cases Produced | | | | | |
| <input checked="" type="checkbox"/> | 0 | <input type="button"/> <= C4:G4 | <input type="button"/> <= 100000 | <input type="button"/> Integer | <input type="button"/> |
| <input checked="" type="checkbox"/> | 20000 | <input type="button"/> <= B4 | <input type="button"/> <= 100000 | <input type="button"/> Step(2) | <input type="button"/> |

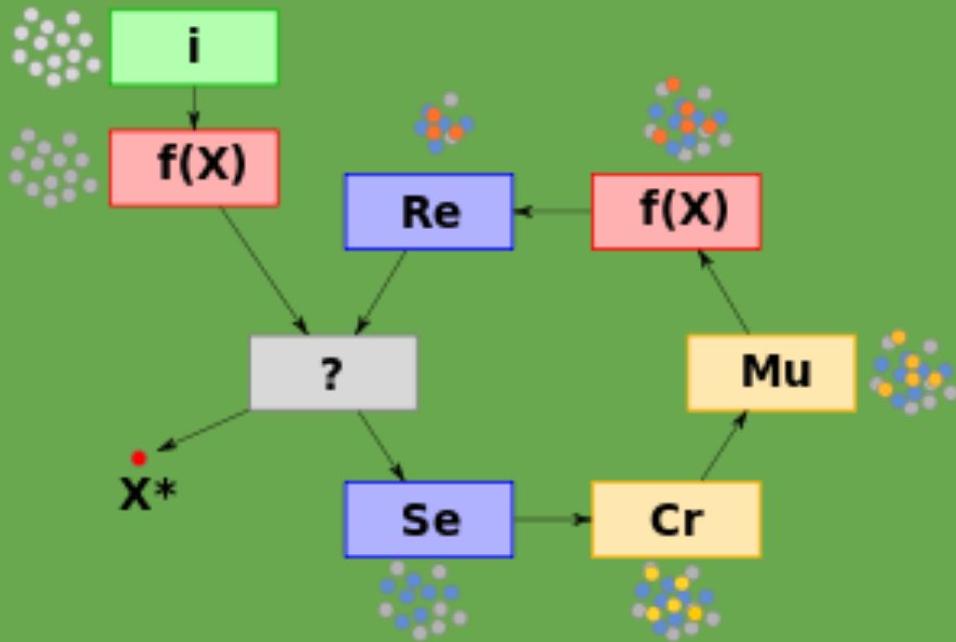
 Add... Delete Group

Constraints

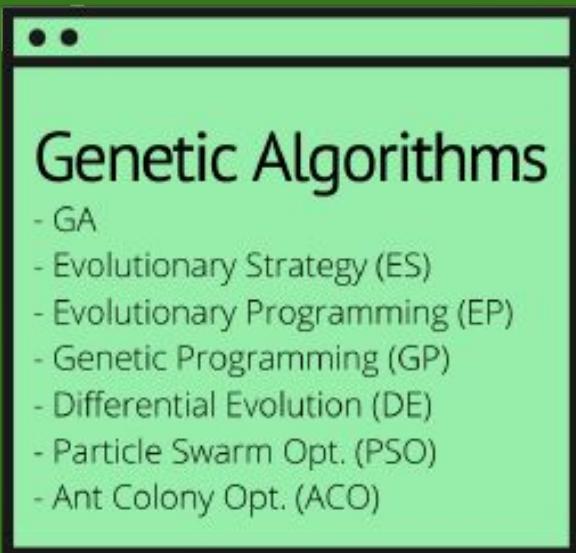
| | Description | Formula | Type | Add... |
|-------------------------------------|--------------------|--------------|------|------------------------|
| <input checked="" type="checkbox"/> | Acceptable total.. | =I8 <= 50000 | Hard | <input type="button"/> |
| <input checked="" type="checkbox"/> | Acceptable ratio.. | =C4>=1.5*B4 | Hard | <input type="button"/> |
| <input checked="" type="checkbox"/> | Acceptable ratio.. | =D4>=1.5* B4 | Hard | <input type="button"/> |

 Edit... Delete OK Cancel

What is...

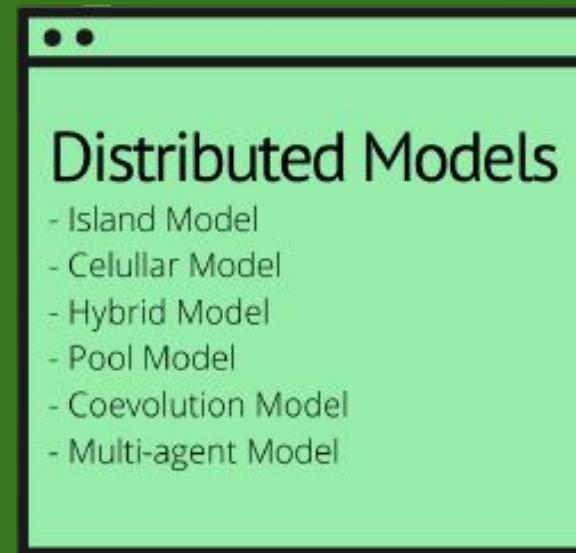


Roadmap . . .



A web browser window with a black header bar containing three dots. The main content area is light green and displays the title "Genetic Algorithms" in large bold letters. Below the title is a bulleted list of various optimization techniques:

- GA
- Evolutionary Strategy (ES)
- Evolutionary Programming (EP)
- Genetic Programming (GP)
- Differential Evolution (DE)
- Particle Swarm Opt. (PSO)
- Ant Colony Opt. (ACO)

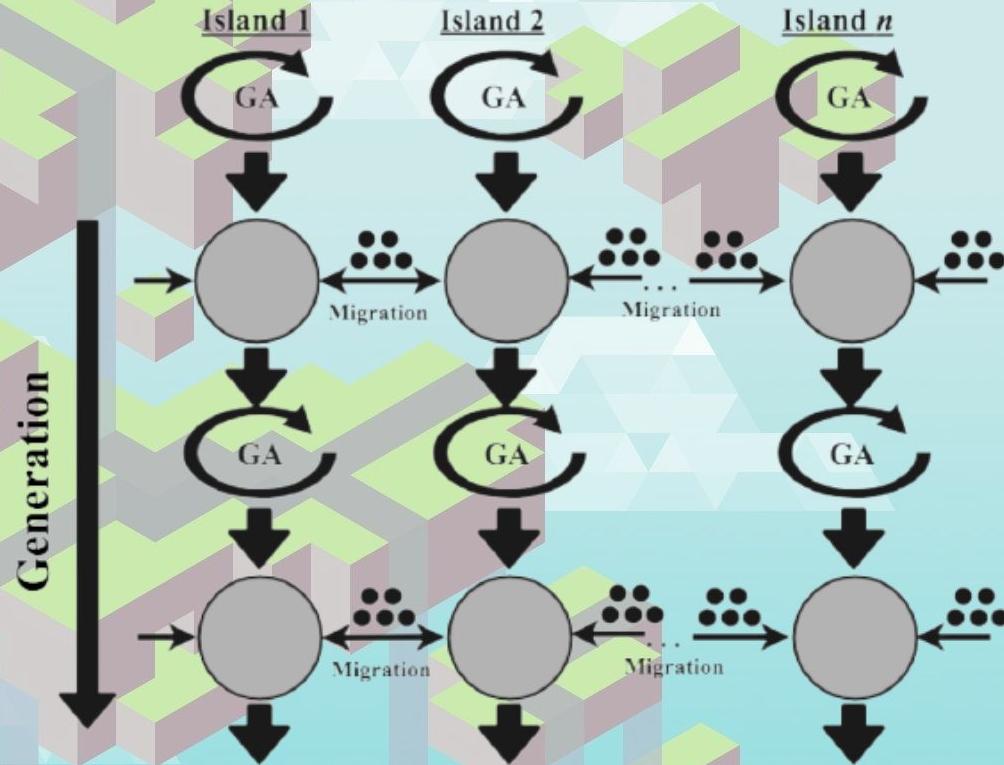


A web browser window with a black header bar containing three dots. The main content area is light green and displays the title "Distributed Models" in large bold letters. Below the title is a bulleted list of distributed models:

- Island Model
- Cellular Model
- Hybrid Model
- Pool Model
- Coevolution Model
- Multi-agent Model

What is...

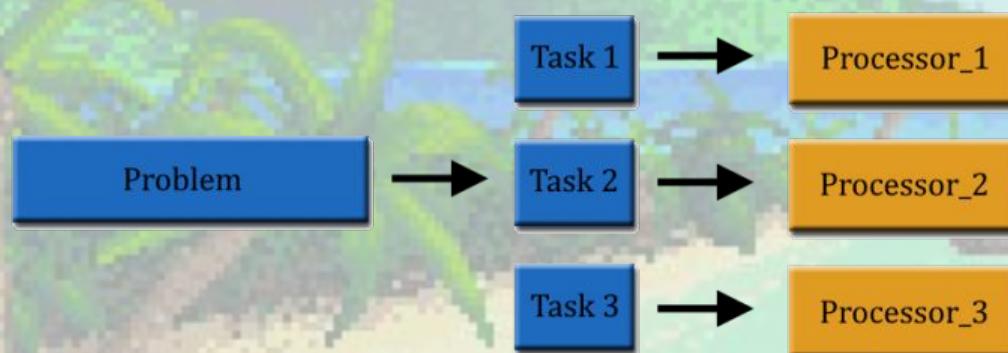
1. A spatially distributed model.
2. Parallelization.
3. Global population is divided into several subpopulations.
4. One processor to one island.
5. Communication : migration.



Serial Computing



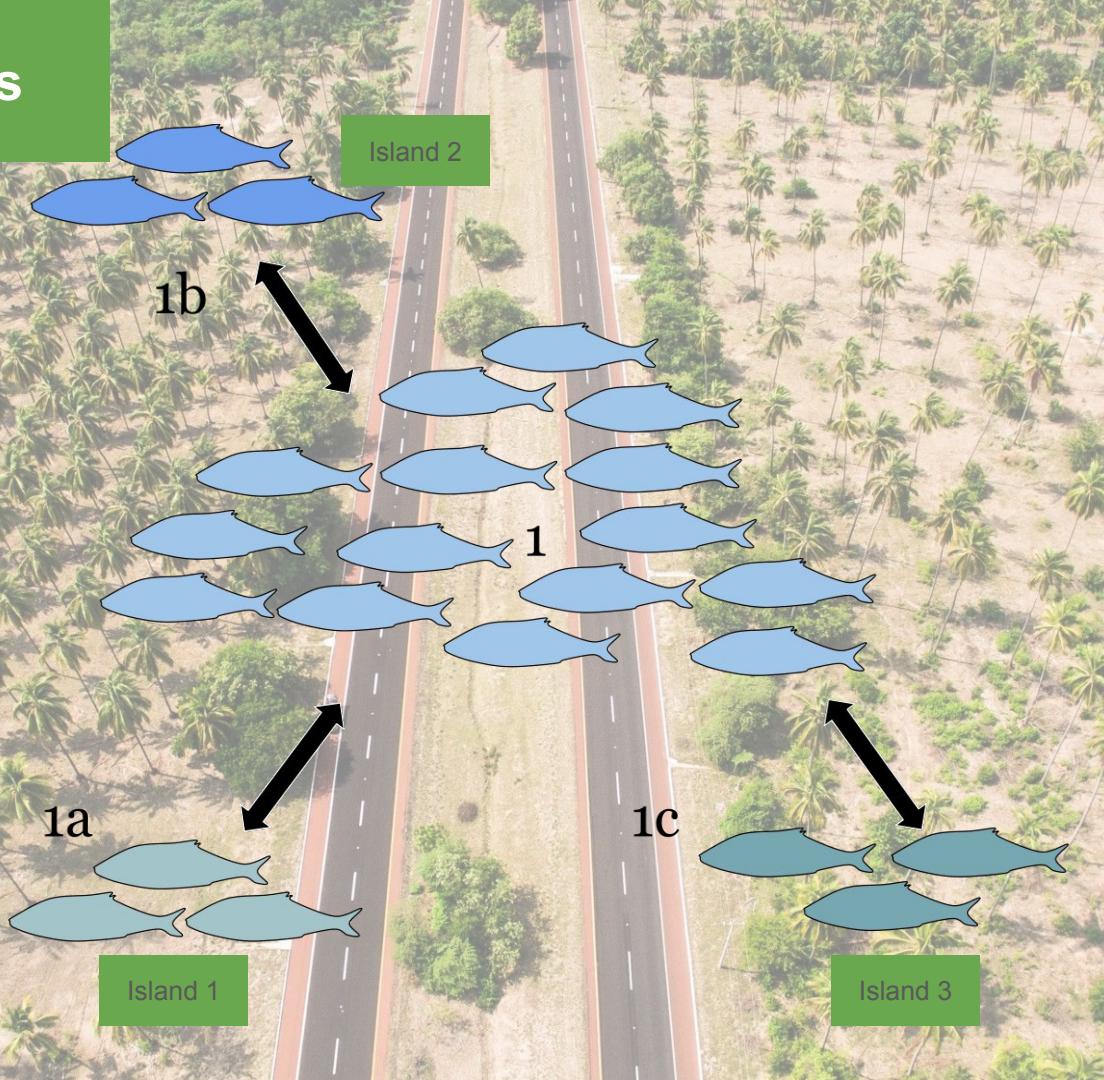
Parallel Computing



Main Features

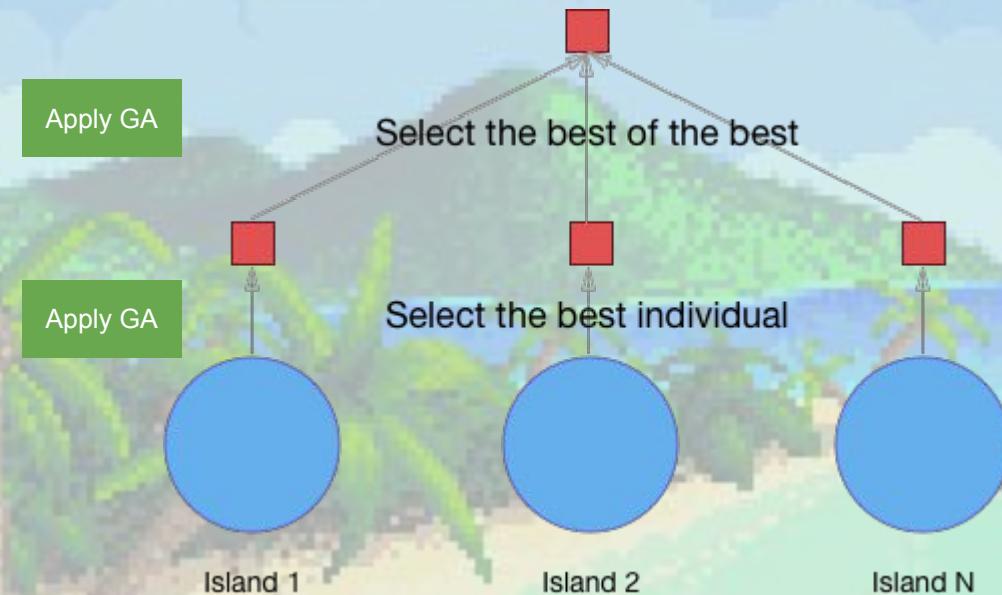
Subsets

Subpopulations of individuals



Main Features

Apply Genetic
Algorithm



Main Features

Migration



Monarch Migration Map

U.S.A.





Types of communication between islands

1. Star communication
2. Network communication
3. Ring communication

Star communication

Island 1
(Slave)

Island 3
(Slave)

Master

Island 2
(Slave)

Island 4
(Slave)

Island 1
(Slave)

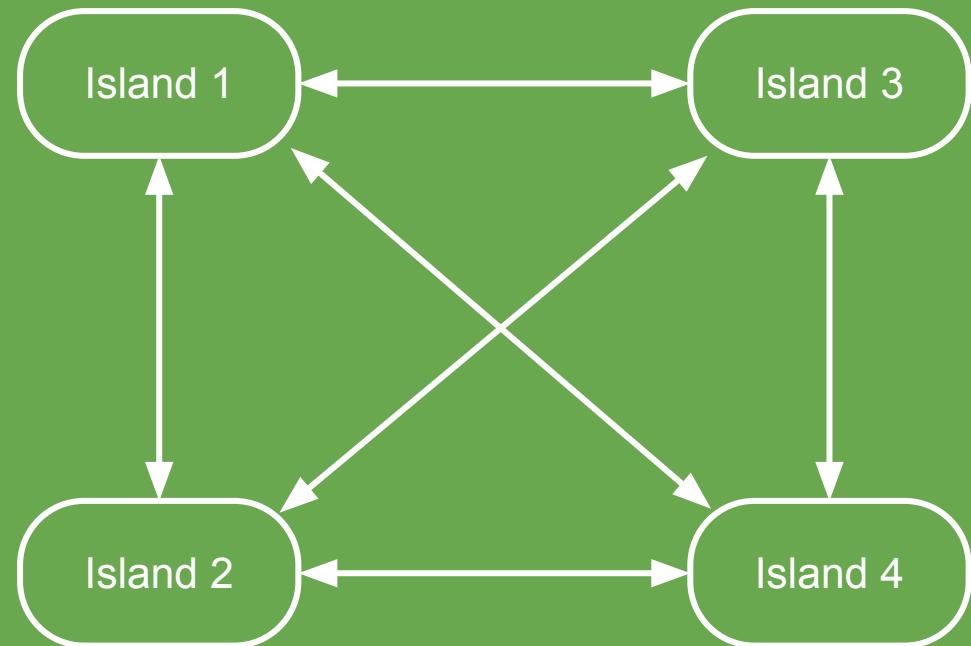
Island 3
(Slave)

Master

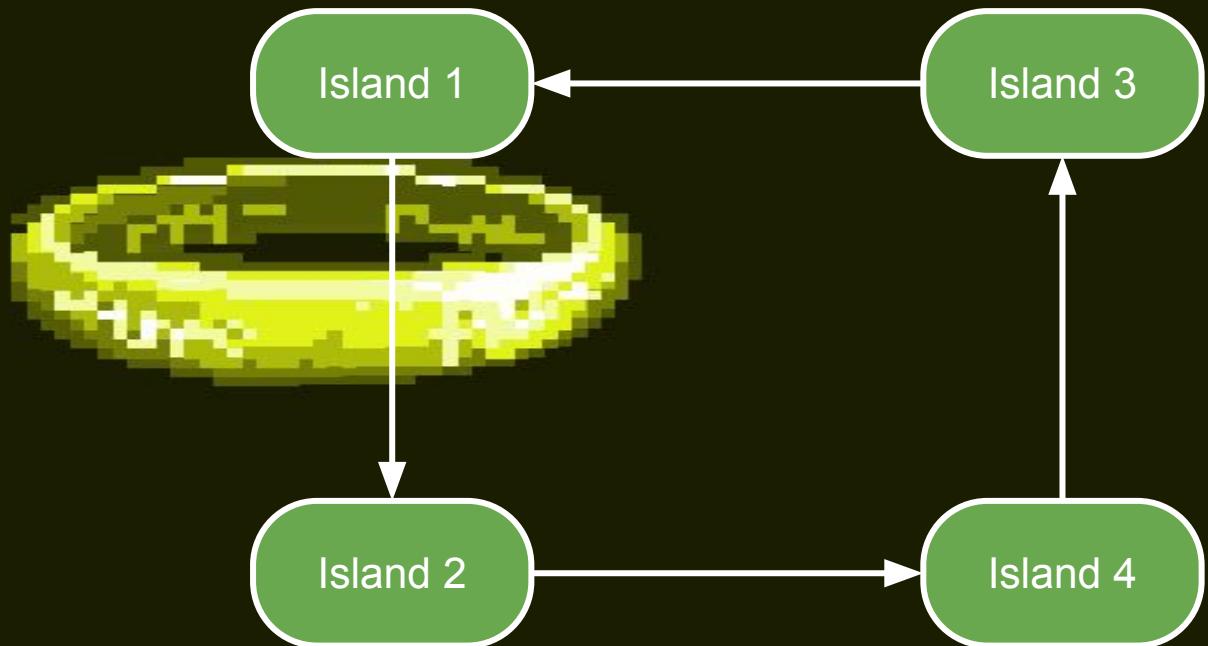
Island 2
(Slave)

Island 4
(Slave)

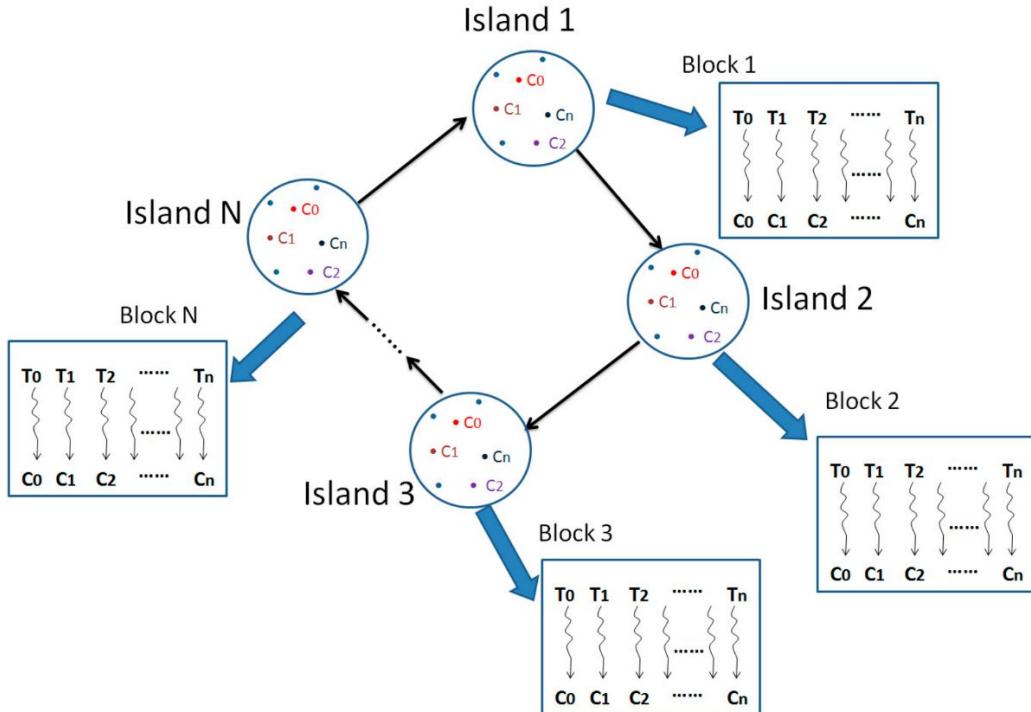
Network communication



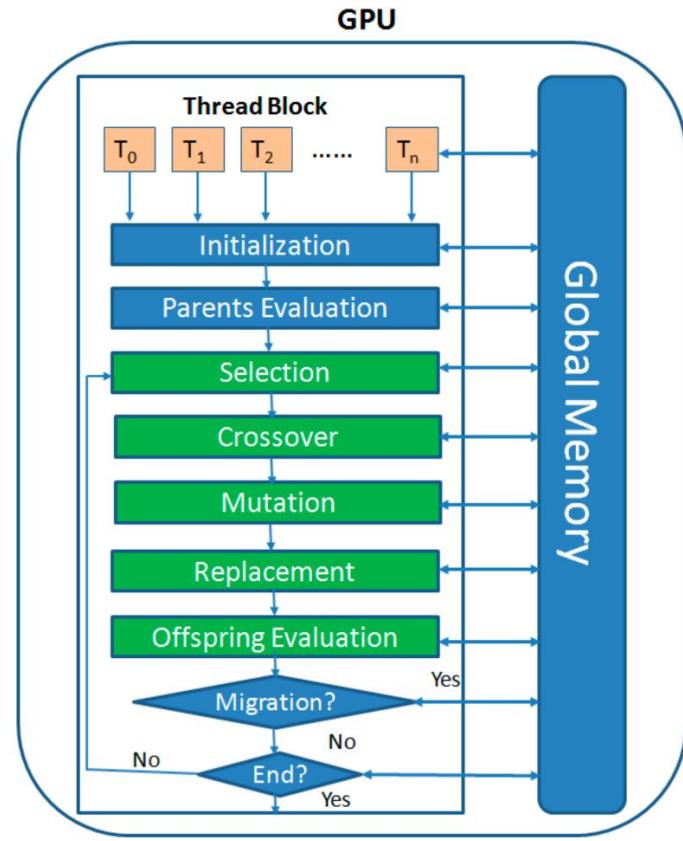
Ring communication



In summary...



(a)



(b)



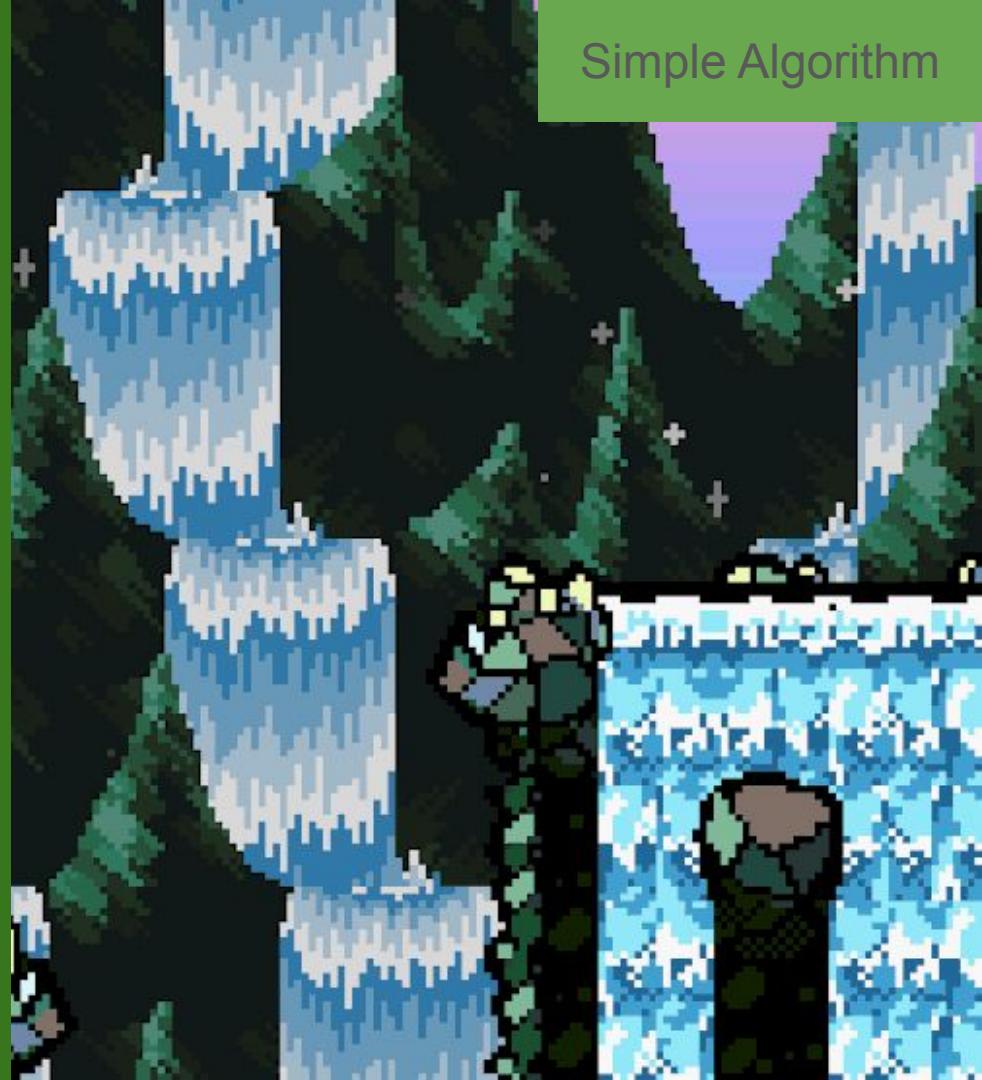
How to development?

Topography



Simple Algorithm

```
produce P subpopulation of size N;  
generation = 1;  
while (not reach the conditions of  
termination){  
  
    for( each subpopulatión ){  
  
        evaluate( population );  
        select( individuals );  
  
        if( generation%frequency == 0){  
            send( k best individuals to neighbors);  
            receive and replace( k individuals);  
        }  
  
        produce new population();  
        mutate();  
    }  
    generation ++;  
}
```



Migrations

Frequent



Applications and examples



Parallel Evolutionary Algorithms (PEA)

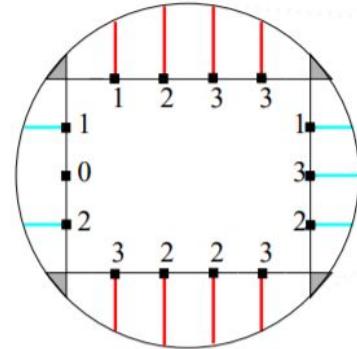
- Operations research
- Engineering and manufacturing
- Finance
- VLSI and telecommunications



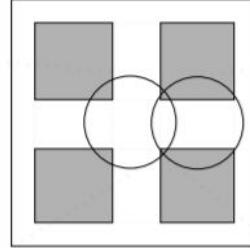
VLSI Design



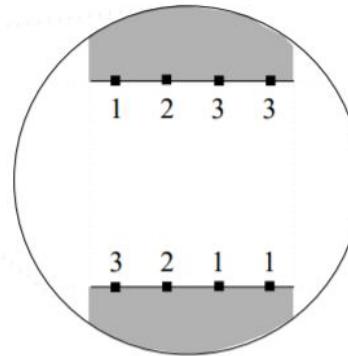
Switchbox routing problem



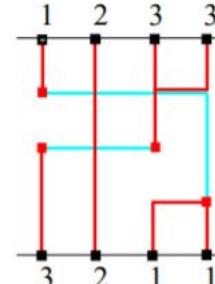
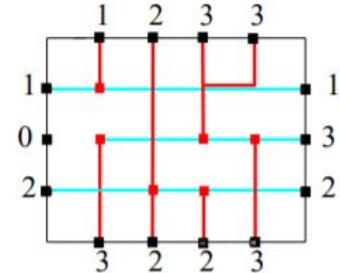
VLSI circuit



Channel routing problem



Possible routing solutions



Considerations

- $l_{nets}(p_i)$ Is the total length of nets.
- $n_{vias}(p_i)$ Is the number of vias
- $l_{par}(p_i)$ Is the total length of adjacent, parallel-routed net segments (cross talk segments)
- w_1, w_2, w_3 are the weight factors

$$Obj(p_i) = w_1 \cdot l_{nets}(p_i) + w_2 \cdot n_{vias}(p_i) + w_3 \cdot l_{par}(p_i)$$

Sources.

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