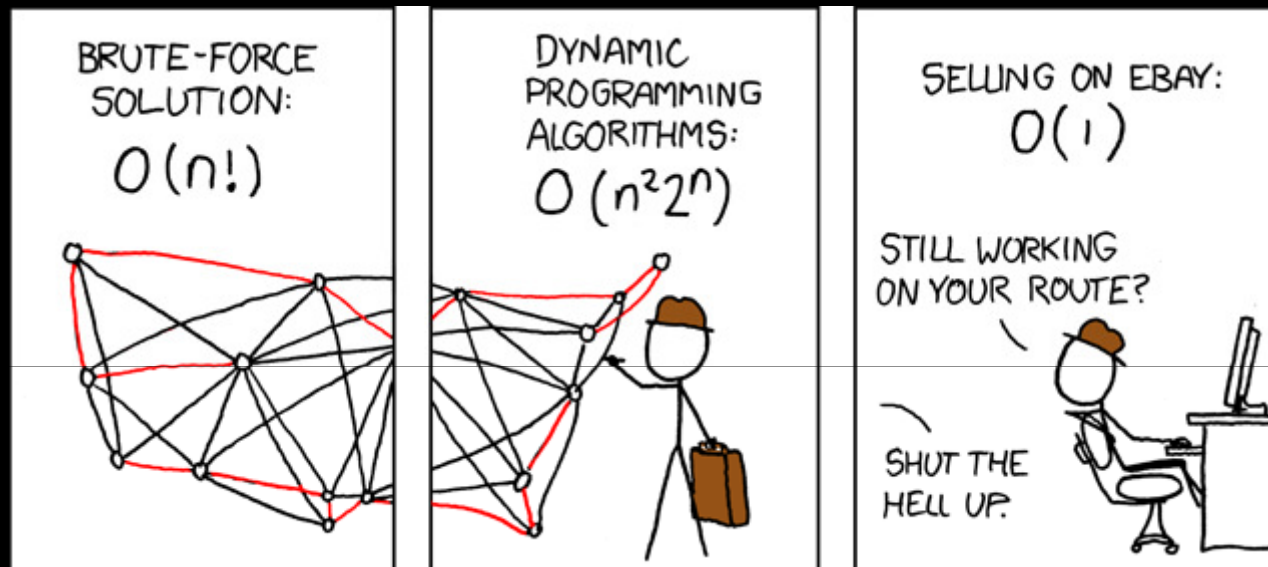


# Algorithm Cup 2010



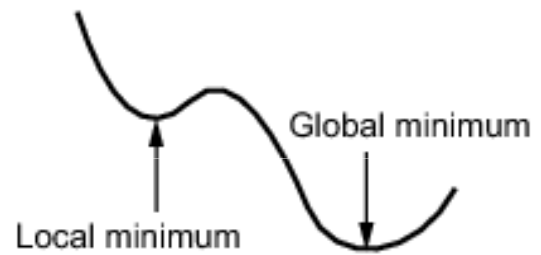
Sergio Paganoni  
I3A – I4PAP

# Construction

- Construction Algorithm
  - Nearest Neighbour
  - 2-Nearest Neighbour
  - 3-Nearest Neighbour
- Winner: NN

# Local Optimization

- 2 OPT

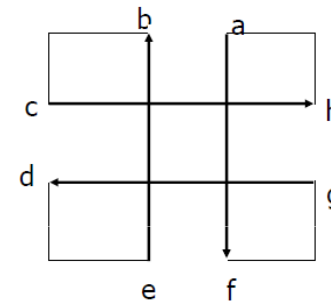


# Simulated Annealing

- Hybridization

Diversification: Double-Bridge

Intensification: 2-OPT



- Parameters: Temperature, DeltaT, Iteration

# Parametrization

- Command-Line parameters
- Take advantage of multicore CPU
- Bash Scripting

- Program parameters:

```
#./coppa -p PROBLEMID -m MAXTIMEMS -c STARTCITY -t  
TEMPERATURE -d DELTA -r RANDOMSEED
```

- How?

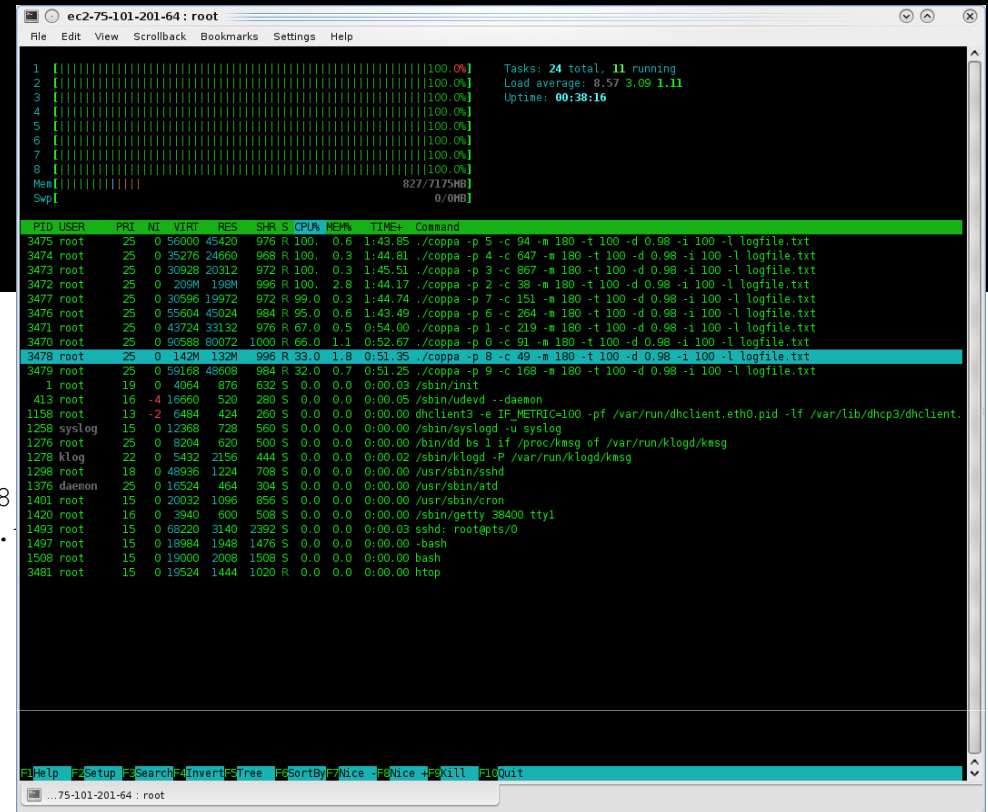
```
getopt(argc, argv, "p:c:m:t:d:l:i:s:r:h")
```

# Lift-off

- Where?  
Amazon EC2 (Elastic Compute Cloud)
- How?  
Unattended with a simple bash script
- How much?  
2 Days
- Log Analysis?  
Sed, grep, awk, ...

# Run script

```
#!/bin/bash
startTemp=100
iteration="100"
maxtime=$1
deltaArray=(0.95 0.955 0.96 0.965 0.97 0.975 0.98)
problems=(ch130.tsp lin318.tsp kroA100.tsp u1060.
eil76.tsp d198.tsp)
startCity=(91 219 38 867 647 94 264 151 49 168)
echo "Starting algorithm cup"
# Iterate starting temperature
for temp in {100..300..10}
do
# Iterate number of iteration
for iter in {100..300..50}
do
# Iterate through delta array and problems
for delta in {0..9..1}
do
for p in {0..9..1}
do
log="${problems[p]}_${startCity[$p]}_${temp}_${iter}_${deltaArray[$delta]}.log"
./coppa -p $p -c ${startCity[$p]} -m $maxtime -t $temp -d ${deltaArray[$delta]} -i $iter >
$log &
done
done
sleepsec=$((maxtime+60))
sleep $sleepsec
done
done
done
```



The screenshot shows a terminal window titled "ec2-75-101-201-64: root". The top part of the terminal displays system statistics: "Tasks: 24 total, 11 running", "Load average: 8.57 3.09 1.11", and "Uptime: 00:38:16". Below this is a progress bar for tasks 1 through 8, each showing 100% completion. A memory usage line shows "Mem: 827/7175MB" and "Swp: 0/0MB". The main part of the terminal is a table of running processes. The table has columns for PID, USER, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command. The processes listed include several instances of the "coppa" command with various parameters, as well as system daemons like "dhclient3", "syslog", "klogd", "sshd", and "httpd". The terminal also shows a menu at the bottom with options like "help", "Setup", "Search", "Invert", "Tree", "SortBy", "Nice", "Kill", and "Quit".

# Parse log file

- After first run: ~5500 logfile
- Find the best:

```
for i in {0..9..1}
do
    error=`grep "SA Best tour with startcity " ../log/${problems[$i]}*.log |
        grep "\[.*\]" | awk '{print $10}' | tr -d "[]" | sort | head -n 1`
    echo ${problems[$i]}: "$error"
done
```

# Second Run

- Script failed
- 1000 processes →

