

Programming Assignment 1: Angry Birds: Part Deux (Smarter Pigs Edition)

OUTPUT/RESULTS DOCUMENT

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This document shows the generated output from our program for different input combinations.

The outputs generated is by considering 6 peers/pigs in the network, hop-to-hop delay in P2P network is 10ms, and birds starting location is (0,0) which is flying at the rate 2 steps/sec.

1. Set up config file with the above specification and network structure as shown in highlighted box in the figure.

```
##__authors__ = "Rahul Raj, Olenka Dey"
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##This is the config file
##Please don't change the order of the parameters

##Number of Pigs. Should be an integer.
Number of pigs = 6

##Number of stones.
Number of stones = 20

##Bird launch coordinate.
##Will start at 0,0 if not specified.
##Birds speed in steps/seconds
##Birds angle in degrees acceptable values (N,E,W,S,NE,ES,SW,NW)
##Bird time in the air should be an integer/float value in sec
Bird launch Coordinate = (0,0)
Bird Speed = 2
Bird Direction = SE
##Birds time it takes to make a landing
Bird Time in the air = 2

### Max hopcount is calculated based on the maximum distance covered
##P2P hop delay from one peer to another. This is in milli-seconds.

## Hop delay is the delay in the P2P network to send message from or
Hop delay = 10

##Pigs Neighbors : It defines the logical/networked neighbors of the
##1:[2,3] meaning peer 1 is connected to peer 2 and 3
## Kindly take care that the pig numbers are within "Number_of_pigs"
#Pigs Neighbors = {1:[2,4,5,6],2:[3,4,6],3:[4,5,8],6:[1,2,5], 5:[1,2
#Pigs Neighbors = {1:[2,3,4],2:[5,6,7],3:[8,9,10],4:[11,12],5:[12]}
#Pigs Neighbors = {1:[2],2:[3],3:[4],4:[5], 5:[6]}
Pigs Neighbors = {1:[2,3],2:[4],3:[5,6]}
###Pigs Neighbors = {1:[2],2:[3]}
```

2. After saving the config file, run the shell script to start the program.

```
olenka@olenka-VirtualBox:~/DOS$ ./run_me.sh
```

3. First, it allocates position to the bird, pigs and stones and places them in the grid as shown below. It also calculates the target coordinate on which the bird will eventually land.

```
Will create 6 new peers...

  0 1 2 3 4 5
0 B S P S S S
1 - P S S P S
2 - S - S P P
3 - - - S S -
4 - S S S - S
5 S S S - P S

Bird launch coordinates are: (0, 0)
Bird will travel 4.0 steps..
Target coordinates of the birds are: (4, 4)
```

4. Second, it checks if the target location is not in pigs coordinate. If so, then pig network will not know about it and thus flooding won't help. So it checks if bird falls on stone or empty space and checks the affected pig. In this case, bird is landing on a stone, which rolls over another stone and eventually target the pig sitting at (3,4).

```
Bird is falling on a stone (4, 4)
Stone at (4, 4) rolled over another stone at (3, 3)
Stone is falling on the pig at (3, 4)
```

5. The nearest pig to the bird's initial coordinate is calculated using Euclidean distance formula, to initiate the message passing in the pig's network about birds landing.

```
Delay in each hop is 10 milli-seconds..
Nearest pig to the bird is: (0, 1)
Pigs locations are [(0, 1), (1, 1), (2, 1), (4, 1), (3, 4), (5, 0)]
```

6. The pig nearest to the bird, i.e. at location (0,1), starts the communication and floods its logically connected pigs about the birds approaching (location indicated in the box is about target location or bird's landing details along with the hop-count and time left before bird hits). The highlighted box shows that pig1 establishes connection with pig2 and pig3.

```
olenka@olenka-VirtualBox:~/DOS$ =====
Client - 1 Connected to its own server..
Target Coordinate is (3, 4)
Time left before bird's landing is 2
Hopcount at location (0, 1) is 4.0

Location of peer-1 with port number 8001 is [0, 1]
sending location to my next peer
Client 8001 Established connection with the server 8002
Client 8001 Established connection with the server 8003
=====
```

7. As pig-1 is connected to pig-2 and pig-3, both the pigs receive the message from one and checks if it was hit or not or if it needs to take any evasive action if the target is him. Otherwise, it simply passes on the message to its peers. You can see the landing time has decreased as the message moved from one hop-level (pig1) to other (pig2 and pig3). They also print the received message from pig1.

```
=====
Client - 2 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.99
Hopcount at location (1, 1) is 3
Received message from Pig1

Location of peer-2 with port number 8002 is [1, 1]
sending location to my next peer
Client 8002 Established connection with the server 8004
=====
Client - 3 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.99
Hopcount at location (2, 1) is 3

Location of peer-3 with port number 8003 is [2, 1]
sending location to my next peer
Client 8003 Established connection with the server 8005
Client 8003 Established connection with the server 8006
=====
```

8. Similarly, the next level of peers (pig2 and pig3) sends the received messages to its peers. And those repeats the same process of checking if it was hit or not.

```
=====
Client - 4 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.98
Hopcount at location (4, 1) is 2

Location of peer-4 with port number 8004 is [4, 1]
sending location to my next peer
Client 8004 Established connection with the server 8001
=====
```

9. When the target coordinate of bird's landing matches with the pig's location, it checks how much time is left and if left, can it take any evasive action to avoid bird hit. It sends out signal to its physical neighbors to take shelter and the pig itself searches for free space around it to move to, to be safe. It displays the score achieved. Here, the target location matches with pig5 location in the grid, and since there was still time left before bird hits (1.98), the pig could move to safe location nearby and sends take shelter signal to its neighbors (As there was no pig in the vicinity, none responded) and displays out the "Score".

```
=====
Client - 5 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.98
Hopcount at location (3, 4) is 2

Location of peer-5 with port number 8005 is [3, 4]
Need to move to nearest available location
Asking neighbors to take shelter..
No pig is nearby this pig !!
Pig at location (3, 4) moved to (4, 3) in order to avoid bird!!
Pig moved to safe location. Bird Dies!!
Score: 0
Sending status of the game
Peer 8005 sending status to peer 8001
Bird at location [3, 4] landed and Pig evaded !!
=====
```

Pig5 moved to safe location

SCORE and sending status signal to rest of the peers.

10. Finally, if the bird dies due to hit in the empty location, the game restarts or ask user to change the config file for next launch based on the input.

```
Will create 6 new peers...

  0 1 2 3 4 5
0 B S P S S S
1 - P S S P S
2 - S - S P P
3 - - - S S -
4 - S S S - S
5 S S S - P S

Bird launch coordinates are: (0, 0)
Bird will travel 4.0 steps..
Target coordinates of the birds are: (4, 4)

Bird falling in open location
Score: 0
Bird Died..
Press 1 to restart or 2 to change config file and press Enter..: 1
Restarting..

Will create 6 new peers...
```

This is just one scenario, there are multiple scenarios for this game, few of them are discussed in the report discussing the test-cases. Finally, the outputs discussed in the document above shows up in a single terminal window as shown in the next page.

Complete output view:

```
Will create 6 new peers...

    0 1 2 3 4 5
0 B P - - S -
1 - P S S S -
2 S P S S S S
3 - S S S P S
4 - P S - S S
5 P S S S - S

Bird launch coordinates are: (0, 0)
Bird will travel 4.0 steps..
Target coordinates of the birds are: (4, 4)

Bird is falling on a stone (4, 4)
Stone at (4, 4) rolled over another stone at (3, 3)
Stone is falling on the pig at (3, 4)

Delay in each hop is 10 milli-seconds..
Nearest pig to the bird is: (0, 1)
Pigs locations are [(0, 1), (1, 1), (2, 1), (4, 1), (3, 4), (5, 0)]

olenka@olenka-VirtualBox:~/DOS$ =====
Client - 1 Connected to its own server..
Target Coordinate is (3, 4)
Time left before bird's landing is 2
Hopcount at location (0, 1) is 4.0

Location of peer-1 with port number 8001 is [0, 1]
sending location to my next peer
Client 8001 Established connection with the server 8002
Client 8001 Established connection with the server 8003
=====
Client - 2 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.99
Hopcount at location (1, 1) is 3

Location of peer-2 with port number 8002 is [1, 1]
sending location to my next peer
Client 8002 Established connection with the server 8004

=====
Client - 3 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.99
Hopcount at location (2, 1) is 3

Location of peer-3 with port number 8003 is [2, 1]
sending location to my next peer
Client 8003 Established connection with the server 8005
Client 8003 Established connection with the server 8006
=====
Client - 4 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.98
Hopcount at location (4, 1) is 2

Location of peer-4 with port number 8004 is [4, 1]
sending location to my next peer
Client 8004 Established connection with the server 8001
=====
Client - 5 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.98
Hopcount at location (3, 4) is 2

Location of peer-5 with port number 8005 is [3, 4]
Need to move to nearest available location
Asking neighbors to take shelter..
No pig is nearby this pig !!
Pig at location (3, 4) moved to (4, 3) in order to avoid bird!!
Pig moved to safe location. Bird Dies!!
Score: 0
Sending status of the game
Peer 8005 sending status to peer 8001
Bird at location [3, 4] landed and Pig evaded !!
=====
Client - 6 Connected to its own server..
Target Coordinate is [3, 4]
Time left before Bird's Landing is 1.98
Hopcount at location (5, 0) is 2

Location of peer-6 with port number 8006 is [5, 0]
sending location to my next peer
Client 8006 Established connection with the server 8001
```