ADVANCED COMPUTER NETWORKS

A
PROJECT

on

“FOG COMPUTING”

Submitted By

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OBJECTIVE:

FOG computing is based on the premise that minimizes service latency, improves Quality of Service and supports emerging Internet of Everything (IoE) applications. It responds to events by eliminating a round trip to the cloud for analysis.

The Objective of this project is to

- To reduce the response time delay for requests to cloud coming from the IoT nodes using Fog Computing technique.

- The project is implemented in Java Programming language.
  1.UDP Sockets are used Sending Requests and Responses between fog and IOT nodes.
  2.TCP/IP sockets are used for communicating between the Fog Nodes and offloading.
  3.UDP Sockets are used for request offloading among fog nodes.

Message Format:

Request Message:

Seq.nuumber" "Message type" "Forward limit" "IoT host name" "IoT port number" "Data"

TCP Update:

fogHostName" "fogTcpPort" "ProcessTime

METHODOLOGY:

The Project is implemented on java platform. Functionalities of Fog nodes were implemented in modules /classes. The program includes the following classes:

- **Class Main:**

The main function invokes the class to read the disk file and starts three threads. The function of three threads are

1. To invoke the class: req_listener to listen to UDP Request
2. To invoke the class: TCP_listener to listen to TCP update messages from neighbors
3. To invoke the class: sendPeriodicUpdate to send periodic TCP updates to neighbors

- **Class req_listener:**

This class contains the method to listen to the incoming UDP requests from IoT request generators and fog nodes on a specified port.

Based on the Total queuing delay and maximum response time of the fog node this class forwards the request to one of the following queues

1. Enqueue the incoming request to the fog request processing queue.
2. Enqueue the incoming request to the cloud processing queue.
3. Offload it to the best neighbor.

- **Class ResponseSender**:

1. This class sends response to the requests in the fog processing queue.
2. It creates a Datagram Socket and send UDP packets to the specified IOT port.
3. This Class in implemented of a different Thread.

- **Class CloudResponseSender:**

1. This class sends response to the requests in the cloud processing queue.
2. It creates a Datagram Socket and send UDP packets to the specified IOT port.
3. This Class in implemented of a different Thread.

- **Class offloader:**

This class offloads the request to the best neighbor.

1. It sorts the neighbor information table based on the processing delay of the neighbor nodes.
2. Offloads the request to the neighbor with the least Processing Time.
3. The class creates a Datagram Socket and offloads the request to neighbor.
4. This class is implemented in a different thread.

- **Class TCP_Listener:**

This class listens for the TCP update messages from the neighbors

1. This class creates a TCP listening socket to listen to the TCP messages on a specified port.
2. It updates the neighbor table with the incoming update message
3. This class is implemented in a different thread.

- **Class SendPeriodicUpdate:**

This class sends the queuing delay of the fog node to its neighbors periodically.

1. It calculates the present queuing delay
2. It creates a TCP Sender Socket and sends the TCP update messages to its neighbors
3. It sleeps for specified interval and sends periodically
4. This class is implemented in a different thread.

- **Class Request:** This Class holds the attributes of the request.

- **Class Neighbor:** This class holds the attributes of the neighbor.

CHALLENGE IN PROJECT EXECUTION:

- The UDP Response packets that were sent to the IOT request generators were either broken or partially received.

- The message sometime failed to send with a message “Size is too large”

- The Size of the UPD Response was from 60kb to 85kb.

- The buffer size of UDP response listener in IOT request generator was 20kb and it has a size
- Mismatch.

- The buffer size of UDP response listener in IOT request generator was enhanced to 100kb and the corresponding packets were received completely.

CONTRIBUTION:

Arun Prakash Themothy Prabu Vincent (axt161330):

The following modules were developed

- Request Processing and sending response by Fog Node
- Request Offloading to neighbor
- Simulation of cloud Processing and sending response
- Main function and Encapsulation of all modules

Jaypreethi Palanisamy (jxp164030):

The following modules were developed

- Receiving TCP update messages from neighbors
- Sending TCP update messages to neighbors
- Updating Neighboring Table Periodically