Distributed Network Programming

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Review

- Socket Programming using TCP and UDP

Outline

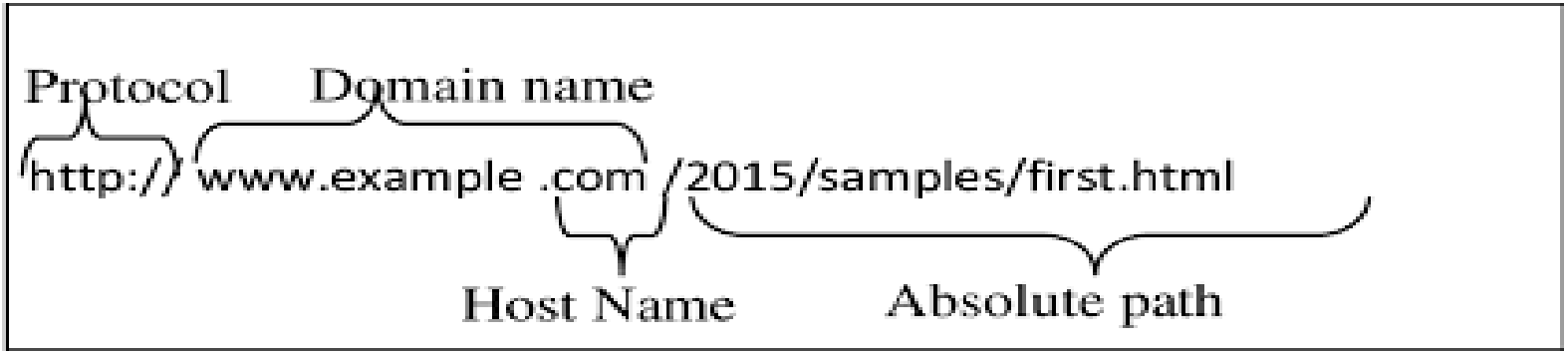
- TCP
- UDP
- IP Address
- Ports
- Socket Programming using TCP and UDP
- Working with URLs and URL Connection Class
- Email Handling using Java Mail API
- Architecture of RMI
- Creating and Executing RMI applications
- Architecture of CORBA
- RMI vs CORBA
- IDL and Simple CORBA Program

Working with URLs and URL Connection Class

- URL provides a reasonably intelligible form to uniquely identify or address information on the Internet.
- URLs are found everywhere; every browser uses them to identify information on the Web.
- Within Java's network class library, the URL class provides a simple, concise API to access information across the Internet using URLs.
- All URLs share the same basic format:
  - http://www.gces.edu.np
  - https://www.gces.edu.np:443/

URL Components

- URL specification is based on four components:
  - First Component: Protocol to use, separated from the rest of the locator by a colon(:) http: , ftp:
  - Second Component: IP Address or host name, begin by // and end by / or optionally a colon
  - Third Component: Port number is optional
  - Fourth Component: Actual file path



URL Class and its properties

URL url = new URL("https://www.gces.edu.np/programs/undergraduate/be-computer")

Given a url, we can retrieve the data associated with it.

Protocol: `System.out.println("Protocol "+url.getProtocol());` // Protocol https

Port: `System.out.println("Port "+url.getPort());` //Port -1

Host: `System.out.println("Host name "+url.getHost());` //Host name www.gces.edu.np

File: `System.out.println("Path "+url.getPath());` //Path /programs/undergraduate/be-computer

URLConnection Class

- **URLConnection** is a general-purpose class for accessing the attributes of a remote object.
- URLConnection is created using openConnection() of url object and then uses it to examine document's properties and content.
  - **URL** url= **new URL**(http://www.internic.net");
  - **URLConnection** urlConnection = url.openConnection();
- URLConnection lets us checkout a remote file's details(like size) before downloading it. This only works for files accessed through HTTP, like websites.
- **getContentType():** This tells you what kind of file it is (e.g., image, text, video). **httpConnection.getContentType()**
- Other properties: **getContentLength( ), getInputStream( )**

HttpURLConnection Class

- Java provides a subclass of **URLConnection** class that provides support for **HTTP Connection**. This is called HttpURLConnection.
- Depending on the protocol specified in the URL, different subclasses of URLConnection are used. HttpURLConnection is for HTTP Connections.
- HTTP connection is how our browser talks to website to get their content.
- We can obtain HttpURLConnection by calling **openConnection() on a URL object** .
  - **URL** url= **new URL**(http://www.internic.net");
  - **URLConnection** httpConnection = (HttpURLConnection)url.openConnection();
  - httpConnection .getRequestMethod());//returns GET
- openConnection() on URL should be casted to (HttpURLConnection) to make sure, we are opening an HTTPConnection.

Email Handling using Java Mail API

- The JavaMail is an API that is used to compose, write and read electronic messages(emails). This API provides platform-independent and protocol-independent framework for sending and receiving mails.
- Core classes of JavaMail API are:
  - **javax.mail**
  - **javax.mail.activation**
- Uses of Java Mail API are as follows:
  - Used at the time of registration(sending “thank you” notification to the client)
  - Forgot password(Sending password to the Client’s email)
  - Sending notifications to important updates.

Protocols used in Java Mail API

- SMTP: Simple Mail Transfer Protocol
  - Provides a mechanism to deliver the email. Apache James Server, cmail server are examples of SMTP. Sending and receiving emails with your host's SMTP server requires authentication.
- POP: Post Office Protocol
  - It provides a mechanism to receive the email. It provides single mail box for each user.
- IMAP: Internet Message Access Protocol
  - It is an advanced protocol for receiving messages. It provides support for multiple mail box for each user. Mailbox can also be shared by multiple users.
- MIME: Multiple Internet Mail Extensions
  - It tells the browser what is being sent, for eg. attachment, format of messages