**CHAPTER 3**

**DESIGN AND IMPLEMENTATION**

This chapter deals with the basic design and its implementation in creation of this software. This JAVA based server is designed using best OOM practices and takes full advantage of JAVA’s Object Oriented Methodology.

**3.1 BASIC FLOW CHARTS**

**3.1.1 REGISTRATION OF USERS**

Auser sends a REGISTER request to the server. The request includes user’s contact list. The SIP Server validates the user’s credentials and if it succeeds then user is successfully registered and server replies with 200 OK response.

**USER B**

**SERVER**

**USER A**

**REGISTER A**

**200 OK**

Actual Message flow of Registration Process is as follows :

REGISTER USER A -> SERVER

REGISTER sip:192.168.43.23 SIP/2.0

Call-ID: e94e44bed7d447e6707ff5c8d5582410@0:0:0:0:0:0:0:0

CSeq: 1 REGISTER

From: "4060" <sip:4060@192.168.43.23>;tag=5296f111

To: "4060" <sip:4060@192.168.43.23>

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-4a734d557563fd1c90978c058a68bea3

Max-Forwards: 70

User-Agent: Jitsi2.8.5426Windows 8

Expires: 600

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>;expires=600

Content-Length: 0

OK SERVER -> USER A

SIP/2.0 200 OK

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-4a734d557563fd1c90978c058a68bea3

From: "4060" <sip:4060@192.168.43.23>;tag=5296f111

To: "4060" <sip:4060@192.168.43.23>

Call-ID: e94e44bed7d447e6707ff5c8d5582410@0:0:0:0:0:0:0:0

CSeq: 1 REGISTER

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>;expires=600

Allow:

Max-Forwards: 70

Allow-Events:

User-Agent: Jitsi2.8.5426Windows 8

Supported:

Expires: 600

Content-Length: 0

**3.1.2 NORMAL FLOW**

In this flow of control, the caller makes a call through an INVITE request which is handled by the server. The server figures out the correct recipient of the call and forwards it. It also sends back a TRYING 100 response back to the caller. The receiver recognizes the INVITE message and there is a ringing bell on the phone of the receiver. He picks up the call and a successful RTP connection is established between both the users. Any user can drop the call by sending a BYE request to the other user. The other user sends an appropriate ACK response and the session terminates.

**SERVER**

**USER B**

**USER A**

**INVITE B**

**INVITE B**

**100 TRYING**

**180 RINGING**

**180 RINGING**

**200 OK**

**200 OK**

**ACK**

**ACK**

**RTP SESSION STARTS**

**BYE A**

**BYE A**

**200 OK**

**200 OK**

The Actual Message flow recorded is as follows :

INVITE USER A -> SERVER

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.81:5000>

Content-Type: application/sdp

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

Max-Forwards: 70

Supported: 100rel, replaces, from-change

P-Early-Media: supported

User-Agent: SIPPER for phoner

P-Preferred-Identity: <sip:8060@192.168.43.23>

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

INVITE SERVER -> USER B

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.23>

Content-Type: application/sdp

Max-Forwards: 69

User-Agent: SIPPER for phoner

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

TRYING SERVER -> USER A

SIP/2.0 100 TRYING

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

User-Agent: SIPPER for phoner

Supported: 100rel, replaces, from-change

Content-Length: 0

RINGING USER B -> SERVER

SIP/2.0 180 Ringing

CSeq: 3 INVITE

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

RINGING SERVER -> USER A

SIP/2.0 180 Ringing

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: "4060" <sip:4060@192.168.43.23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

OK USER B -> SERVER

SIP/2.0 200 OK

CSeq: 3 INVITE

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Type: application/sdp

Content-Length: 167

v=0

o=4060-jitsi.org 0 0 IN IP4 192.168.43.81

s=-

c=IN IP4 192.168.43.81

t=0 0

m=audio 5001 RTP/AVP 8 0

a=rtpmap:8 PCMA/8000

a=rtpmap:0 PCMU/8000

a=rtcp:5004

OK SERVER -> USER A

SIP/2.0 200 OK

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Content-Length: 167

v=0

o=4060-jitsi.org 0 0 IN IP4 192.168.43.81

s=-

c=IN IP4 192.168.43.81

t=0 0

m=audio 5001 RTP/AVP 8 0

a=rtpmap:8 PCMA/8000

a=rtpmap:0 PCMU/8000

a=rtcp:5004

ACK USER A -> SERVER

ACK sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK00e851e8c345e611906d832a577aa99e;rport

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 ACK

Contact: <sip:8060@192.168.43.81:5000>

Max-Forwards: 70

Content-Length: 0

ACK SERVER -> USER B

ACK sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK00e851e8c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 ACK

Contact: <sip:8060@192.168.43.81:5000>

Content-Length: 0

BYE USER B -> SERVER

BYE sip:8060@192.168.43.23 SIP/2.0

CSeq: 1 BYE

From: <sip:4060@192.168.43.23>;tag=ff84cb15

To: <sip:8060@192.168.43.23>;tag=1443862458

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

Max-Forwards: 70

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-e9845c7bc20c1c01b1db6c8d9e7786ba

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

BYE SERVER -> USER A

BYE sip:8060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-e9845c7bc20c1c01b1db6c8d9e7786ba;recieved=192.168.43.81

From: <sip:4060@192.168.43.23>;tag=ff84cb15

To: <sip:8060@192.168.43.23>;tag=1443862458

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 1 BYE

Contact: "4060" <sip:4060@192.168.43.23>

Max-Forwards: 69

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

OK USER A -> SERVER

SIP/2.0 200 OK

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-e9845c7bc20c1c01b1db6c8d9e7786ba;recieved=192.168.43.81

From: <sip:4060@192.168.43.23>;tag=ff84cb15

To: <sip:8060@192.168.43.23>;tag=1443862458

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 1 BYE

Contact: <sip:8060@192.168.43.81:5000>

Server: SIPPER for phoner

Content-Length: 0

OK SERVER -> USER B

SIP/2.0 200 OK

Via: SIP/2.0/UDP 192.168.43.81:61284;branch=z9hG4bK-363638-e9845c7bc20c1c01b1db6c8d9e7786ba;recieved=192.168.43.81

From: <sip:4060@192.168.43.23>;tag=ff84cb15

To: <sip:8060@192.168.43.23>;tag=1443862458

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 1 BYE

Content-Length: 0

**3.1.3 CANCELLATION PROCESS**

When the user who is calling, ends the call then a CANCEL request is sent to the server. The server forwards the CANCEL request to the receiver. Receiver sends an 200 OK and a 487 REQUEST TERMINATED response. The session is then cancelled successfully.

**USER B**

**SERVER**

**USER A**

**INVITE B**

**INVITE B**

**CANCEL**

**CANCEL**

**180 RINGING**

**180 RINGING**

**100 TRYING**

**487 REQUEST TERMINATED**

**200 OK**

**200 OK**

**487 REQUEST TERMINATED**

The Actual Message flow recorded is as follows :

INVITE USER A -> SERVER

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.81:5000>

Content-Type: application/sdp

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

Max-Forwards: 70

Supported: 100rel, replaces, from-change

P-Early-Media: supported

User-Agent: SIPPER for phoner

P-Preferred-Identity: <sip:8060@192.168.43.23>

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

INVITE SERVER -> USER B

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.23>

Content-Type: application/sdp

Max-Forwards: 69

User-Agent: SIPPER for phoner

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

TRYING SERVER -> USER A

SIP/2.0 100 TRYING

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

User-Agent: SIPPER for phoner

Supported: 100rel, replaces, from-change

Content-Length: 0

RINGING USER B -> SERVER

SIP/2.0 180 Ringing

CSeq: 3 INVITE

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

RINGING SERVER -> USER A

SIP/2.0 180 Ringing

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: "4060" <sip:4060@192.168.43.23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

CANCEL USER A -> SERVER

CANCEL sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

CSeq: 3 CANCEL

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

Max-Forwards: 70

User-Agent: SIPPER for phoner

Content-Length: 0

CANCEL SERVER -> USER B

CANCEL sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

CSeq: 3 CANCEL

Max-Forwards: 69

User-Agent: SIPPER for phoner

Content-Length: 0

OK USER B -> SERVER

SIP/2.0 200 OK

CSeq: 3 CANCEL

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>;tag=fb48d1b7

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:6819;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

OK SERVER -> USER A

SIP/2.0 200 OK

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>;tag=fb48d1b7

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

CSeq: 3 CANCEL

Contact: "4060" <sip:4060@192.168.43.23>

Content-Length: 0

REQUEST TERMINATED USER B -> SERVER

SIP/2.0 487 Request Terminated

CSeq: 3 INVITE

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>;tag=fb48d1b7

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:6819;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

REQUEST TERMINATED SERVER -> USER A

SIP/2.0 487 Request Terminated

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80f677efc145e6119d2ef15dce95fe22;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=696308355

To: <sip:4060@192.168.43.23>;tag=fb48d1b7

Call-ID: 80F677EF-C145-E611-9D2D-F15DCE95FE22@192.168.43.81

CSeq: 3 INVITE

Contact: "4060" <sip:4060@192.168.43.23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

**3.1.4 WHEN BUSY**

When the receiver terminates the call during the ringing phase, then the caller receives 486 BUSY HERE response. In this scenario, reciever is busy and sends a 486 BUSY HERE response to caller’s INVITE. Note that the non 2xx response is acknowledged on a hop-by-hop basis instead of end-to-end. Also note that many SIP UAs will not return a 486 response, as they have multiple lines and other features.

**ACK**

**ACK**

**486 BUSY HERE**

**486 BUSY HERE**

**100 TRYING**

**USER B**

**INVITE B**

**INVITE B**

**SERVER**

**USER A**

The Actual Message flow recorded is as follows :

INVITE USER A -> SERVER

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.81:5000>

Content-Type: application/sdp

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

Max-Forwards: 70

Supported: 100rel, replaces, from-change

P-Early-Media: supported

User-Agent: SIPPER for phoner

P-Preferred-Identity: <sip:8060@192.168.43.23>

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

INVITE SERVER -> USER B

INVITE sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: <sip:8060@192.168.43.23>

Content-Type: application/sdp

Max-Forwards: 69

User-Agent: SIPPER for phoner

Content-Length: 476

v=0

o=- 3361950259 1 IN IP4 192.168.43.81

s=SIPPER for phoner

c=IN IP4 192.168.43.81

t=0 0

m=audio 5002 RTP/AVP 8

a=rtpmap:8 PCMA/8000

a=sendrecv

TRYING SERVER -> USER A

SIP/2.0 100 TRYING

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Allow: INVITE, ACK, BYE, CANCEL, INFO, MESSAGE, NOTIFY, OPTIONS, REFER, UPDATE

User-Agent: SIPPER for phoner

Supported: 100rel, replaces, from-change

Content-Length: 0

RINGING USER B -> SERVER

SIP/2.0 180 Ringing

CSeq: 3 INVITE

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:61284;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

RINGING SERVER -> USER A

SIP/2.0 180 Ringing

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK802488e6c345e611906d832a577aa99e;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=1443862458

To: <sip:4060@192.168.43.23>;tag=ff84cb15

Call-ID: 802488E6-C345-E611-906C-832A577AA99E@192.168.43.81

CSeq: 3 INVITE

Contact: "4060" <sip:4060@192.168.43.23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

BUSY HERE USER B -> SERVER

SIP/2.0 486 Busy here

CSeq: 3 INVITE

Call-ID: 80D32C76-C245-E611-AF8B-005EA72B6F73@192.168.43.81

From: <sip:8060@192.168.43.23>;tag=3059277927

To: <sip:4060@192.168.43.23>;tag=725a0d84

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790,SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80d32c76c245e611af8c005ea72b6f73;rport;recieved=192.168.43.81

Contact: "4060" <sip:4060@192.168.43.81:29034;transport=udp;registering\_acc=192\_168\_43\_23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

BUSY HERE SERVER -> USER A

SIP/2.0 486 Busy here

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80d32c76c245e611af8c005ea72b6f73;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=3059277927

To: <sip:4060@192.168.43.23>;tag=725a0d84

Call-ID: 80D32C76-C245-E611-AF8B-005EA72B6F73@192.168.43.81

CSeq: 3 INVITE

Contact: "4060" <sip:4060@192.168.43.23>

User-Agent: Jitsi2.8.5426Windows 8

Content-Length: 0

ACK USER A -> SERVER

ACK sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80d32c76c245e611af8c005ea72b6f73;rport

From: <sip:8060@192.168.43.23>;tag=3059277927

To: <sip:4060@192.168.43.23>;tag=725a0d84

Call-ID: 80D32C76-C245-E611-AF8B-005EA72B6F73@192.168.43.81

CSeq: 3 ACK

Content-Length: 0

ACK SERVER -> USER B

ACK sip:4060@192.168.43.23 SIP/2.0

Via: SIP/2.0/UDP 192.168.43.23:5060;branch=z9hG4bK2d4790

Via: SIP/2.0/UDP 192.168.43.81:5000;branch=z9hG4bK80d32c76c245e611af8c005ea72b6f73;rport;recieved=192.168.43.81

From: <sip:8060@192.168.43.23>;tag=3059277927

To: <sip:4060@192.168.43.23>;tag=725a0d84

Call-ID: 80D32C76-C245-E611-AF8B-005EA72B6F73@192.168.43.81

CSeq: 3 ACK

Contact:

Content-Length: 0

**CHAPTER 4**

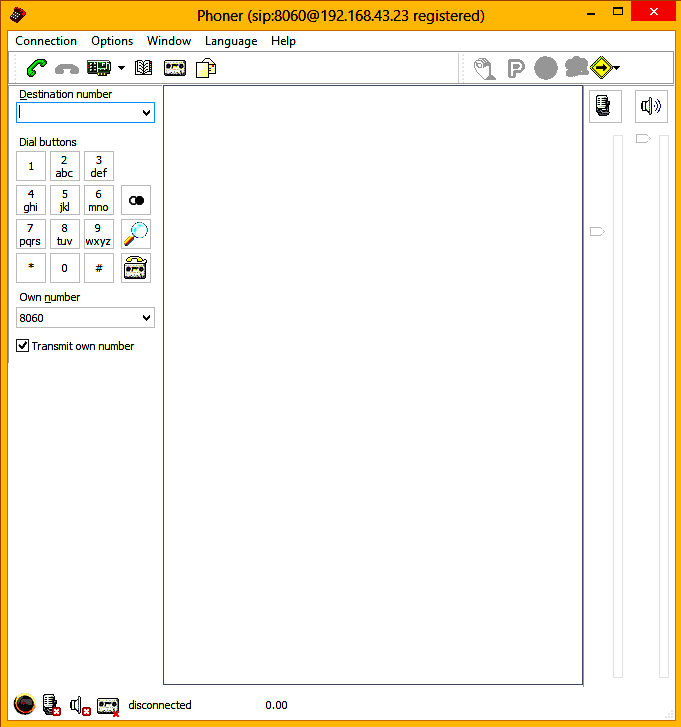
**USAGE AND DISCUSSION**

This chapter contains screenshots of the working of the software and basic guidelines of its usage. This is a step by step method that answers the question of how to actually use the software. Please note that this software is thoroughly tested under various conditions and found to be reliable for the user.

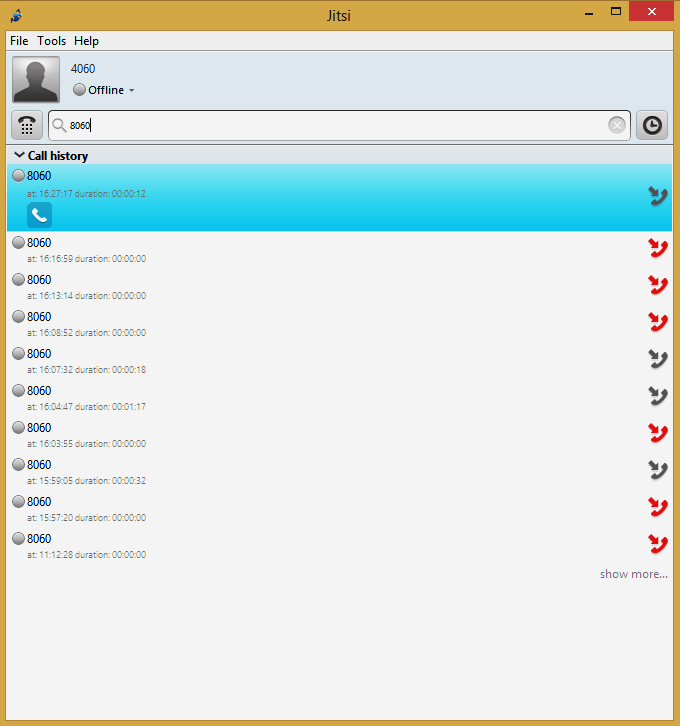
**4.1 STEPS WITH SCREENSHOTS**

* **DOWNLOAD PHONER (SIP COMMUNICATOR) ON CLIENT**

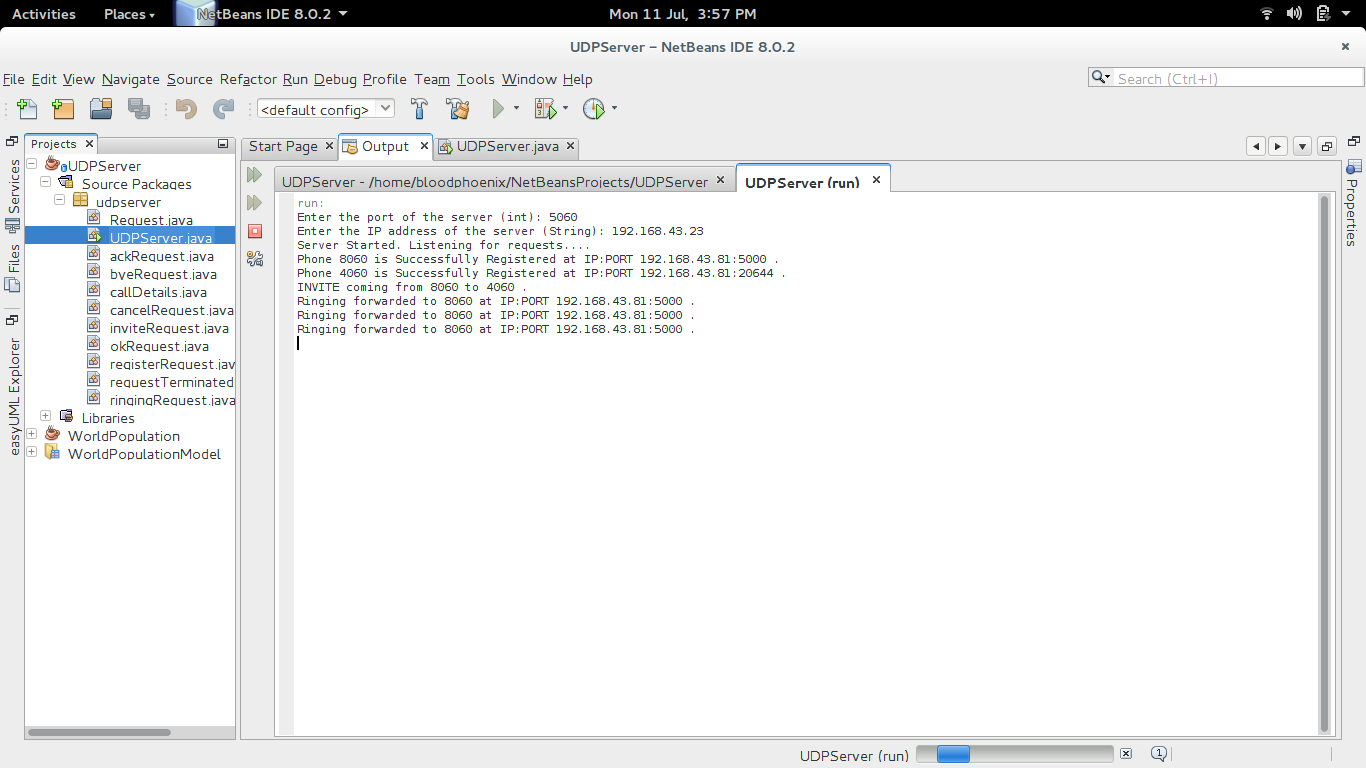
Phoner is a freeware application for Microsoft Windows, from Win2k up to Win7. This application enables voice connections to landline, cellular network and VoIP. Phoner can be used as softphone on stationary and mobile computer devices attached to analogue or digital (ISDN) subscriber lines and as SIP client.



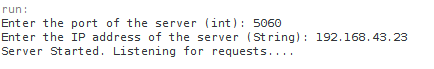
Jitsi is also a popular SIP Communicator.



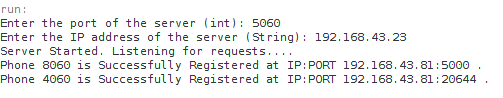
* **SET UP NETBEANS 8.0.2 or later with JDK 1.6 or later**



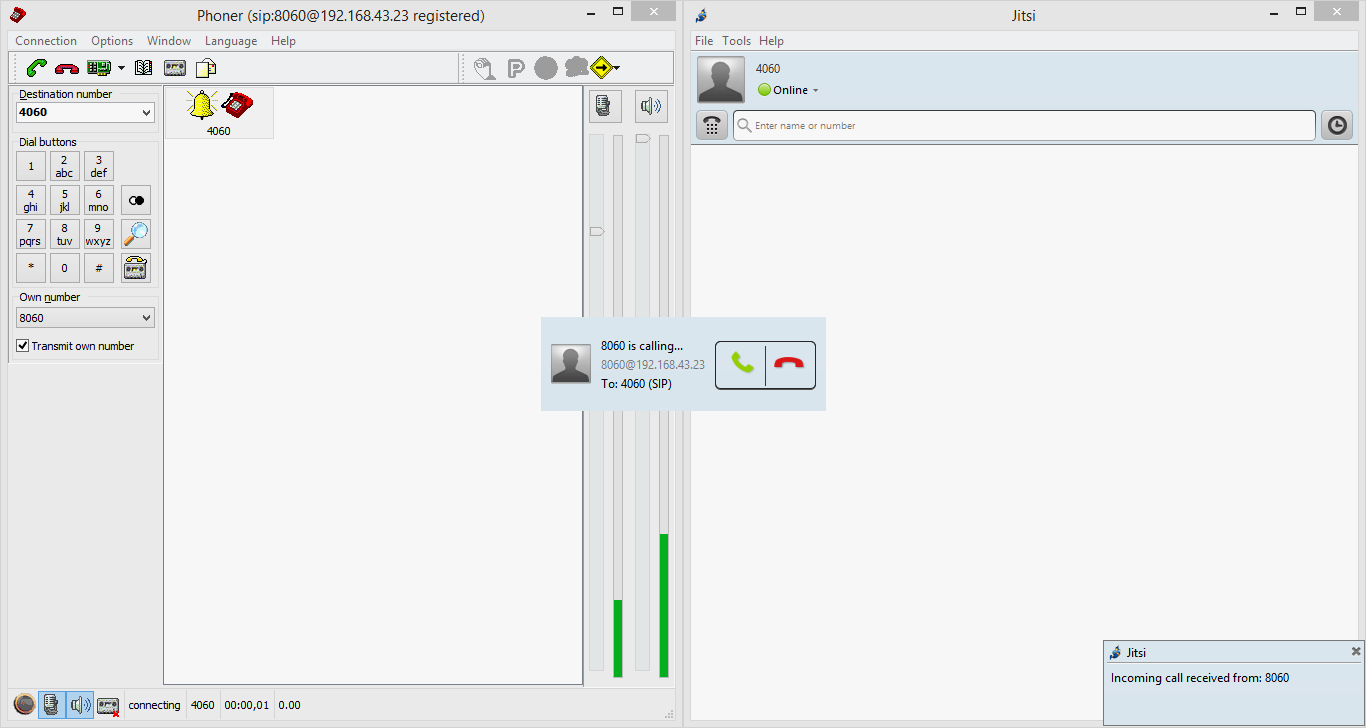
* **RUN THE CODE ON A SERVER SPECIFYING THE PORT AND IP**



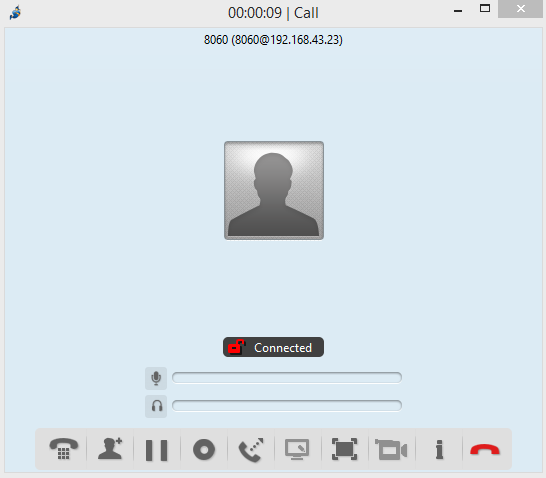
Clients will register….



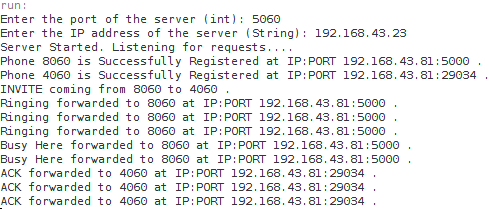
* **RUN PHONER ON CLIENT COMPUTER AND SET SERVER IP AS REGISTRAR**
* **NOW DIAL THE NUMBER OF ANY REGISTERED USER AND CALL**



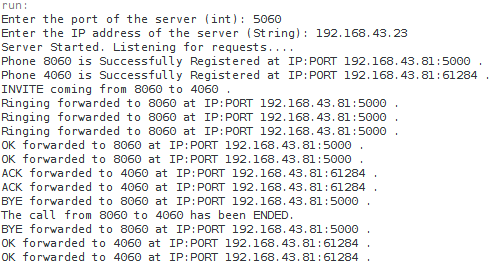
* **RTP SESSION IS ETABLISHED WHEN ‘CONNECTED’ IS DISPLAYED**



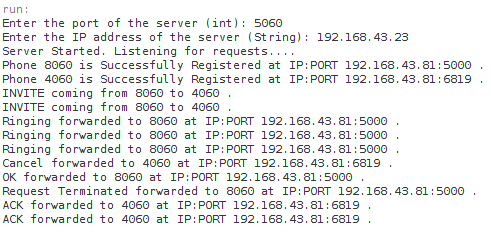
* **CLICK THE RED ‘END CALL’ WHEN FINISHED TALKING**
* **LOG SCREEN DURING ‘BUSY HERE’**



* **LOG SCREEN DURING NORMAL FLOW**



* **LOG SCREEN DURING CANCELATION**



**CONCLUSION**

The **VoIP Communication using SIP** provides easy communication among users using only an internet connection or a local area network if available. The technologies used in developing this project are easily implemented and have vast support and user base worldwide.

Whole project is maintained on **Github** under the name **UDP-SIP-Server** which can be forked and modified as per the need of the user.

**Project Link :** **https://github.com/srajat/UDP-SIP-Server**

Please visit [**www.github.com/srajat**](http://www.github.com/srajat) for more projects.

**APPENDIX**

**CODE**

**MAIN CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File UDPServer.java

\*/

**import** java**.**net**.\*;**

**import** java**.**io**.\*;**

**import** java**.**util**.**HashMap**;**

**import** java**.**util**.**StringTokenizer**;**

public class UDPServer

**{**

private static final int ECHOMAX **=** 2048**;** //Stores max length of recieved message in bytes

private static HashMap**<**String**,**String**>** REGISTERED **=** **new** HashMap**<**String**,**String**>();**

//HashMap of REGISTERED users

private static HashMap**<**String**,**callDetails**>** CURRENTCALLS **=** **new** HashMap**<**String**,**callDetails**>();** //HashMap of Current Calls going on

public static void main**(**String**[]** args**)** **throws** IOException

**{**

BufferedReader br **=** **new** BufferedReader**(new** InputStreamReader**(**System**.**in**));**

System**.**out**.**print**(**"Enter the port of the server (int): "**);**

int servPort **=** Integer**.**parseInt**(**br**.**readLine**());**

System**.**out**.**print**(**"Enter the IP address of the server (String): "**);**

String servIp **=** br**.**readLine**();**

System**.**out**.**println**(**"Server Started. Listening for requests...."**);**

//Create new packet to recieve into

DatagramSocket socket **=** **new** DatagramSocket**(**servPort**)** **;**

DatagramPacket packet **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

**for** **(;;)** //Loops infinitely

**{**

socket**.**receive**(**packet**);** //Blocks till packet recieved

InetAddress clientAddress **=** packet**.**getAddress**();** //client's IP

int clientPort **=** packet**.**getPort**();** //client's Port

byte**[]** arr **=** **new** byte**[**packet**.**getLength**()];**

System**.**arraycopy**(**packet**.**getData**(),** packet**.**getOffset**(),** arr**,** 0**,** arr**.**length**);**

String requestMsg **=** **new** String**(**arr**);** //recieved Message

StringTokenizer st **=** **new** StringTokenizer**(**requestMsg**,**"\r\n"**);**

String line1 **=** st**.**nextToken**();** //stores first line of recieved message

String typeOfMsg **=** line1**.**substring**(**0**,** line1**.**indexOf**(**" "**));**

**if(**"REGISTER"**.**equals**(**typeOfMsg**))** //If message is of type Register

**{**

registerRequest r **=** **new** registerRequest**();** //new register object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow-Events"**.**equals**(**feildName**))**

r**.**allowEvents **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Expires"**.**equals**(**feildName**))**

r**.**expires **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//add to registered the user toRegister

String sipUri **=** r**.**contact**.**substring**(**r**.**contact**.**indexOf**(**":"**)+**1**,** r**.**contact**.**indexOf**(**";"**));**

String number**,**ipPort**;**

**if(!**sipUri**.**contains**(**">"**))**

**{**

//this means there is no > (for Jitsi)

number **=** sipUri**.**substring**(**0**,** sipUri**.**indexOf**(**"@"**));**

ipPort **=** sipUri**.**substring**(**sipUri**.**indexOf**(**"@"**)+**1**,** sipUri**.**length**());**

**}**

**else**

**{**

//this means there is a > (for Phoner)

number **=** sipUri**.**substring**(**0**,** sipUri**.**indexOf**(**"@"**));**

ipPort **=** sipUri**.**substring**(**sipUri**.**indexOf**(**"@"**)+**1**,** sipUri**.**length**()-**1**);**

**}**

//check if already registered

boolean isRegistered **=** REGISTERED**.**containsKey**(**number**);**

int expires **=** Integer**.**parseInt**(**r**.**expires**.**trim**());**

**if(!**isRegistered **&&** expires **>** 0**)** //register

**{**

System**.**out**.**println**(**"Phone "**+**number**+**" is Successfully Registered at IP:PORT "**+**ipPort**+**" ."**);**

REGISTERED**.**put**(**number**,** ipPort**);**

**}**

**else** **if(**isRegistered **&&** expires **==** 0**)** //unregister

**{**

System**.**out**.**println**(**"Phone "**+**number**+**" is Successfully UNREGISTERED."**);**

REGISTERED**.**remove**(**number**);**

**}**

//send OK response to caller

byte**[]** send **=** r**.**OK\_200**().**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**clientAddress**);**

p**.**setPort**(**clientPort**);**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

**}**

**if(**"INVITE"**.**equals**(**typeOfMsg**))** //If message is of type Invite

**{**

inviteRequest r **=** **new** inviteRequest**();** //new Invite object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Type"**.**equals**(**feildName**))**

r**.**contentType **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**)**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"P-Early-Media"**.**equals**(**feildName**))**

r**.**pEarlyMedia **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"P-Preferred-Identity"**.**equals**(**feildName**))**

r**.**prefferedIdentity **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

**{**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**break;**

**}**

**}**

**while(**st**.**hasMoreTokens**())** //Fill data into SDP part of msg

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**"="**));**

**if(**"v"**.**equals**(**feildName**))**

r**.**v **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"o"**.**equals**(**feildName**))**

r**.**o **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"s"**.**equals**(**feildName**))**

r**.**s **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"c"**.**equals**(**feildName**))**

r**.**c **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"t"**.**equals**(**feildName**))**

r**.**t **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"m"**.**equals**(**feildName**))**

r**.**m **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"a"**.**equals**(**feildName**))**

r**.**a**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**()));**

**}**

//find who is calling

String callerNumber **=** r**.**from**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

//find who to send this invite

String calleeNumber **=** line1**.**substring**(**line1**.**indexOf**(**":"**)+**1**,**line1**.**indexOf**(**"@"**));**

String calleeIp **=** extractIpOrPort**(**REGISTERED**.**get**(**calleeNumber**),**0**);**

String calleePort **=** extractIpOrPort**(**REGISTERED**.**get**(**calleeNumber**),**1**);**

System**.**out**.**println**(**"INVITE coming from "**+**callerNumber**+**" to " **+** calleeNumber **+** " ."**);**

//send trying back to caller

byte**[]** send **=** r**.**TRYING\_100**().**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**clientAddress**);**

p**.**setPort**(**clientPort**);**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

//Now forward this packet to callee

byte**[]** send1 **=** r**.**forwardInvite**(**line1**,** servIp**,** servPort**).**getBytes**();**

DatagramPacket p1 **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p1**.**setAddress**(**InetAddress**.**getByName**(**calleeIp**));**

p1**.**setPort**(**Integer**.**parseInt**(**calleePort**.**trim**()));**

p1**.**setData**(**send1**);**

socket**.**send**(**p1**);**

//add details to CURRENTCALLS

callDetails cd **=** **new** callDetails**();**

cd**.**caller **=** callerNumber**;**

cd**.**called **=** calleeNumber**;**

String callId **=** r**.**callId**.**substring**(**0**,** r**.**callId**.**indexOf**(**"@"**));**

CURRENTCALLS**.**put**(**callId**,** cd**);**

**}**

**if(**"SIP/2.0 180 Ringing"**.**equals**(**line1**))** //If message is of type Ringing

**{**

ringingRequest r **=** **new** ringingRequest**();** //new Ringing Object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//extract details of who to forward

String fwdNumber **=** r**.**from**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"Ringing forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward ringing

byte**[]** send **=** r**.**forwardRinging**(**servIp**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

**}**

**if(**"SIP/2.0 200 OK"**.**equals**(**line1**))** //If message is of type OK

**{**

//recieved OK from callee

okRequest r **=** **new** okRequest**();**

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Type"**.**equals**(**feildName**))**

r**.**contentType **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"P-Early-Media"**.**equals**(**feildName**))**

r**.**pEarlyMedia **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"P-Preferred-Identity"**.**equals**(**feildName**))**

r**.**prefferedIdentity **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

**{**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**break;**

**}**

**}**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**"="**));**

**if(**"v"**.**equals**(**feildName**))**

r**.**v **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"o"**.**equals**(**feildName**))**

r**.**o **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"s"**.**equals**(**feildName**))**

r**.**s **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"c"**.**equals**(**feildName**))**

r**.**c **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"t"**.**equals**(**feildName**))**

r**.**t **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"m"**.**equals**(**feildName**))**

r**.**m **=** nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**());**

**else** **if(**"a"**.**equals**(**feildName**))**

r**.**a**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**"="**)+**1**,**nextLine**.**length**()));**

**}**

//Find out fwd Ok to whom

String fwdNumber **=** r**.**from**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"OK forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward OK

byte**[]** send **=** r**.**forwardOk**(**servIp**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

**}**

**if(**"ACK"**.**equals**(**typeOfMsg**))** //If message is of type ACK

**{**

ackRequest r **=** **new** ackRequest**();** //New ACK object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//whom to send this ack

String fwdNumber **=** r**.**to**.**substring**(**r**.**to**.**indexOf**(**":"**)+**1**,**r**.**to**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"ACK forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward ack

byte**[]** send **=** r**.**forwardAck**(**line1**,** servIp**,** servPort**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

**}**

**if(**"BYE"**.**equals**(**typeOfMsg**))** //If message is of type Bye

**{**

byeRequest r **=** **new** byeRequest**();** //new Bye object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//whom to send this bye

String fwdNumber **=** r**.**to**.**substring**(**r**.**to**.**indexOf**(**":"**)+**1**,**r**.**to**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"BYE forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//Forward BYE

byte**[]** send **=** r**.**forwardBye**(**line1**,** servIp**,** servPort**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

//remove this call from CURRENTCALLS

String callId **=** r**.**callId**.**substring**(**0**,** r**.**callId**.**indexOf**(**"@"**));**

**if(**CURRENTCALLS**.**containsKey**(**callId**))**

**{**

System**.**out**.**println**(**"The call from "**+**CURRENTCALLS**.**get**(**callId**).**caller**+**" to "**+**CURRENTCALLS**.**get**(**callId**).**called**+**" has been ENDED."**);**

CURRENTCALLS**.**remove**(**callId**);**

**}**

**}**

**if(**"CANCEL"**.**equals**(**typeOfMsg**))** //If message is of type Cancel

**{**

cancelRequest r **=** **new** cancelRequest**();** //new Cancel object

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//Find forward cancel to whom

String fwdNumber **=** r**.**to**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"Cancel forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward cancel

byte**[]** send **=** r**.**forwardCancel**(**line1**,**servIp**,**servPort**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

//remove callDetails

String callId **=** r**.**callId**.**substring**(**0**,**r**.**callId**.**indexOf**(**"@"**));**

**if(**CURRENTCALLS**.**containsKey**(**callId**))**

CURRENTCALLS**.**remove**(**callId**);**

**}**

**if(**line1**.**contains**(**"487 Request"**))** //If message is of type 487

**{**

requestTerminatedRequest r **=** **new** requestTerminatedRequest**();**

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//forward to whom

String fwdNumber **=** r**.**from**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"Request Terminated forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward 487

byte**[]** send **=** r**.**forwardrequestTerminated**(**line1**,**servIp**,**servPort**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

**}**

**if(**line1**.**contains**(**"486 Busy"**))** //If message is of type Busy

**{**

requestTerminatedRequest r **=** **new** requestTerminatedRequest**();**

String feildName **=** ""**;**

String nextLine **=** ""**;**

**while(**st**.**hasMoreTokens**())**

**{**

nextLine **=** st**.**nextToken**();**

feildName **=** nextLine**.**substring**(**0**,**nextLine**.**indexOf**(**":"**));**

**if(**"Via"**.**equals**(**feildName**))**

r**.**via**.**add**(**nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**()));**

**else** **if(**"From"**.**equals**(**feildName**))**

r**.**from **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"To"**.**equals**(**feildName**))**

r**.**to **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Call-ID"**.**equals**(**feildName**))**

r**.**callId **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"CSeq"**.**equals**(**feildName**))**

r**.**cSeq **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Contact"**.**equals**(**feildName**))**

r**.**contact **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Allow"**.**equals**(**feildName**))**

r**.**allow **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Max-Forwards"**.**equals**(**feildName**))**

r**.**maxForwards **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"User-Agent"**.**equals**(**feildName**))**

r**.**userAgent **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Supported"**.**equals**(**feildName**))**

r**.**supported **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**else** **if(**"Content-Length"**.**equals**(**feildName**))**

r**.**contentLength **=** nextLine**.**substring**(**nextLine**.**indexOf**(**" "**)+**1**,**nextLine**.**length**());**

**}**

//forward to whom

String fwdNumber **=** r**.**from**.**substring**(**r**.**from**.**indexOf**(**":"**)+**1**,** r**.**from**.**indexOf**(**"@"**));**

String fwdIp **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**0**);**

String fwdPort **=** extractIpOrPort**(**REGISTERED**.**get**(**fwdNumber**),**1**);**

System**.**out**.**println**(**"Busy Here forwarded to "**+**fwdNumber**+**" at IP:PORT "**+**fwdIp**+**":"**+**fwdPort**+**" ."**);**

//forward 486

byte**[]** send **=** r**.**forwardrequestTerminated**(**line1**,**servIp**,**servPort**).**getBytes**();**

DatagramPacket p **=** **new** DatagramPacket**(new** byte**[**ECHOMAX**],** ECHOMAX**);**

p**.**setAddress**(**InetAddress**.**getByName**(**fwdIp**));**

p**.**setPort**(**Integer**.**parseInt**(**fwdPort**.**trim**()));**

p**.**setData**(**send**);**

socket**.**send**(**p**);**

//remove from CURRENTCALLS

String callId **=** r**.**callId**.**substring**(**0**,**r**.**callId**.**indexOf**(**"@"**));**

**if(**CURRENTCALLS**.**containsKey**(**callId**))**

CURRENTCALLS**.**remove**(**callId**);**

**}**

packet**.**setLength**(**ECHOMAX**);**

**}**

**}**

private static String extractIpOrPort**(**String s**,**int choice**)** //Returns IP or PORT from SIP URI

**{**

**if(**choice **==** 0**)** //returns IP if choice == 0

**{**

**return** s**.**substring**(**0**,** s**.**indexOf**(**":"**));**

**}**

**else** //else returns PORT

**return** s**.**substring**(**s**.**indexOf**(**":"**)+**1**);**

**}**

**}**

**ACK REQUEST CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File ackRequest.java

\*/

**import** java**.**util**.**ArrayList**;**

public class ackRequest **extends** Request

**{**

ArrayList**<**String**>** via**;** //List of via headers

ackRequest**()** //constructor

**{**

**super();**

via **=** **new** ArrayList**<>();**

**}**

public String forwardAck**(**String line1**,**String servIp**,**int servPort**)**

**{**

String fwd\_res **=** line1 **+** "\r\n"**;**

//add recieved to topmost via feild

String upperViaFeild **=** via**.**get**(**0**);**

String recieved **=** upperViaFeild**.**substring**(**upperViaFeild**.**indexOf**(**" "**)+**1**,** upperViaFeild**.**indexOf**(**":"**));**

upperViaFeild **=** upperViaFeild **+** ";recieved=" **+** recieved**;**

via**.**set**(**0**,** upperViaFeild**);**

//add this server's Via tag

via**.**add**(**0**,**"SIP/2.0/UDP "**+**servIp**+**":"**+**servPort**+**";branch=z9hG4bK2d4790"**);**

//add via feilds

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** contact **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: 0\r\n\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**BYE REQUEST CLASS**

package udpserver**;**

**import** java**.**util**.**ArrayList**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File byeRequest.java

\*/

public class byeRequest **extends** Request

**{**

ArrayList**<**String**>** via**;**

byeRequest**()**

**{**

**super();**

via **=** **new** ArrayList**<>();**

**}**

public String forwardBye**(**String line1**,**String servIp**,**int servPort**)**

**{**

String fwd\_res **=** line1 **+** "\r\n"**;**

//add recieved to topmost via feild

String upperViaFeild **=** via**.**get**(**0**);**

String recieved **=** upperViaFeild**.**substring**(**upperViaFeild**.**indexOf**(**" "**)+**1**,** upperViaFeild**.**indexOf**(**":"**));**

upperViaFeild **=** upperViaFeild **+** ";recieved=" **+** recieved**;**

via**.**set**(**0**,** upperViaFeild**);**

//add this server's Via tag

via**.**add**(**0**,**"SIP/2.0/UDP "**+**servIp**+**":"**+**servPort**+**";branch=z9hG4bK2d4790"**);**

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)** //add all via headers

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

String modifiedContact **=** contact**.**substring**(**0**,**contact**.**indexOf**(**"@"**)+**1**)+** servIp**+**">"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** modifiedContact **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Max-Forwards: " **+** **(**Integer**.**parseInt**(**maxForwards**.**trim**())-**1**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: " **+** contentLength **+** "\r\n\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**CALL DETAILS CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File callDetails.java

\*/

public class callDetails

**{**

String caller**;** //Stores caller Phone number

String called**;** //Stores the Called Phone number

callDetails**()** //constructor

**{**

caller **=** ""**;**

called **=** ""**;**

**}**

**}**

**CANCEL REQUEST CLASS**

package udpserver**;**

**import** java**.**util**.**ArrayList**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File cancelRequest.java

\*/

public class cancelRequest **extends** Request

**{**

ArrayList**<**String**>** via**;**

cancelRequest**()**

**{**

**super();**

via **=** **new** ArrayList**<>();**

**}**

public String forwardCancel**(**String line1**,**String servIp**,**int servPort**)**

**{**

String fwd\_res **=** line1 **+** "\r\n"**;**

//add recieved to topmost via feild

String upperViaFeild **=** via**.**get**(**0**);**

String recieved **=** upperViaFeild**.**substring**(**upperViaFeild**.**indexOf**(**" "**)+**1**,** upperViaFeild**.**indexOf**(**":"**));**

upperViaFeild **=** upperViaFeild **+** ";recieved=" **+** recieved**;**

via**.**set**(**0**,** upperViaFeild**);**

//add this server's Via tag

via**.**add**(**0**,**"SIP/2.0/UDP "**+**servIp**+**":"**+**servPort**+**";branch=z9hG4bK2d4790"**);**

//add via feilds

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Max-Forwards: " **+** **(**Integer**.**parseInt**(**maxForwards**.**trim**())-**1**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: 0" **+** "\r\n\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**INVITE REQUEST CLASS**

package udpserver**;**

**import** java**.**util**.**ArrayList**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File inviteRequest.java

\*/

public class inviteRequest **extends** Request

**{**

String contentType**,**pEarlyMedia**,**prefferedIdentity**;**

String v**,**o**,**s**,**c**,**t**,**m**;**

ArrayList**<**String**>** a**,**via**;**

public inviteRequest**()**

**{**

**super();**

**this.**contentType **=** ""**;**

**this.**pEarlyMedia **=** ""**;**

**this.**prefferedIdentity **=** ""**;**

**this.**v **=** ""**;**

**this.**c **=** ""**;**

**this.**m **=** ""**;**

**this.**o **=** ""**;**

**this.**s **=** ""**;**

**this.**t **=** ""**;**

a **=** **new** ArrayList**<>();**

via **=** **new** ArrayList**<>();**

**}**

public String TRYING\_100**()** //method to generate trying response

**{**

String trying\_res **=** "SIP/2.0 100 TRYING\r\n"**;**

//add recieved to topmost via feild

String upperViaFeild **=** via**.**get**(**0**);**

String recieved **=** upperViaFeild**.**substring**(**upperViaFeild**.**indexOf**(**" "**)+**1**,** upperViaFeild**.**indexOf**(**":"**));**

upperViaFeild **=** upperViaFeild **+** ";recieved=" **+** recieved**;**

via**.**set**(**0**,** upperViaFeild**);**

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

trying\_res **=** trying\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "From: " **+** from **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "To: " **+** to **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "Call-ID: " **+** callId **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "Allow: " **+** allow **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "Supported: " **+** supported **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "Content-Length: 0" **+** "\r\n"**;**

trying\_res **=** trying\_res **+** "\r\n"**;**

**return** trying\_res**;**

**}**

public String forwardInvite**(**String line1**,**String servIp**,**int servPort**)** //to generate fwd response

**{**

String fwd\_res **=** line1 **+** "\r\n"**;**

//add this server's Via tag

via**.**add**(**0**,**"SIP/2.0/UDP "**+**servIp**+**":"**+**servPort**+**";branch=z9hG4bK2d4790"**);**

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

String modifiedContact **=** contact**.**substring**(**0**,**contact**.**indexOf**(**"@"**)+**1**)+** servIp**+**">"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** modifiedContact **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Type: " **+** contentType **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Max-Forwards: " **+** **(**Integer**.**parseInt**(**maxForwards**.**trim**())-**1**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: " **+** contentLength **+** "\r\n\r\n"**;**

fwd\_res **=** fwd\_res **+** "v=" **+** v **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "o=" **+** o **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "s=" **+** s **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "c=" **+** c **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "t=" **+** t **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "m=" **+** m **+** "\r\n"**;**

**for(**int in**=**0**;**in**<**a**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "a=" **+** a**.**get**(**in**)** **+** "\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**OK REQUEST CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File okRequest.java

\*/

public class okRequest **extends** inviteRequest

**{**

okRequest**()**

**{**

**super();**

**}**

public String forwardOk**(**String servIp**)**

**{**

String fwd\_res **=** "SIP/2.0 200 OK\r\n"**;**

**if(**via**.**get**(**0**).**contains**(**","**))**

**{**

String modifiedVia **=** via**.**get**(**0**).**substring**(**via**.**get**(**0**).**indexOf**(**","**)+**1**,**via**.**get**(**0**).**length**());**

via**.**set**(**0**,**modifiedVia**);**

**}**

**else**

via**.**remove**(**0**);**

//add via feilds

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

**if(**cSeq**.**contains**(**"CANCEL"**))** //If this OK is in response to a CANCEL then

**{**

String modifiedContact **=** contact**.**substring**(**0**,**contact**.**indexOf**(**"@"**)+**1**)+** .1 MAIN CLASS client.servIp**+**">"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** modifiedContact **+** "\r\n"**;**

**}**

fwd\_res **=** fwd\_res **+** "Content-Length: " **+** contentLength **+** "\r\n\r\n"**;**

**if(!**cSeq**.**contains**(**"BYE"**)** **&&** **!**cSeq**.**contains**(**"CANCEL"**))** /\*If this OK is not in response to a

BYE or a CANCEL then

\*/

**{**

fwd\_res **=** fwd\_res **+** "v=" **+** v **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "o=" **+** o **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "s=" **+** s **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "c=" **+** c **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "t=" **+** t **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "m=" **+** m **+** "\r\n"**;**

**for(**int in**=**0**;**in**<**a**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "a=" **+** a**.**get**(**in**)** **+** "\r\n"**;**

**}**

**return** fwd\_res**;**

**}**

**}**

**REGISTER REQUEST CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File registerRequest.java

\*/

public class registerRequest **extends** Request

**{**

String allowEvents**,**expires**;**

public registerRequest**(**String via**,**String from**,**String to**,**String callId**,**String cSeq**,**String contact**,**String allow

**,**String maxForwards**,**String allowEvents**,**String userAgent**,**String supported**,**String expires**,**

String contentLength**)**

**{**

**this.**via **=** via**;**

**this.**from **=** from**;**

**this.**to **=** to**;**

**this.**callId **=** callId**;**

**this.**cSeq **=** cSeq**;**

**this.**contact **=** contact**;**

**this.**allow **=** allow**;**

**this.**maxForwards **=** maxForwards**;**

**this.**allowEvents **=** allowEvents**;**

**this.**userAgent **=** userAgent**;**

**this.**supported **=** supported**;**

**this.**expires **=** expires**;**

**this.**contentLength **=** contentLength**;**

**}**

public registerRequest**()**

**{**

**super();**

**this.**allowEvents **=** ""**;**

**this.**expires **=** ""**;**

**}**

public String OK\_200**()**

**{**

String ok\_res **=** "SIP/2.0 200 OK\r\n"**;**

ok\_res **=** ok\_res **+** "Via: " **+** via **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "From: " **+** from **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "To: " **+** to **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Call-ID: " **+** callId **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Contact: " **+** contact **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Allow: " **+** allow **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Max-Forwards: " **+** maxForwards **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Allow-Events: " **+** allowEvents **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Supported: " **+** supported **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Expires: " **+** expires **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "Content-Length: " **+** contentLength **+** "\r\n"**;**

ok\_res **=** ok\_res **+** "\r\n"**;**

**return** ok\_res**;**

**}**

**}**

**REQUEST CLASS**

package udpserver**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File Request.java

\*/

public class Request

**{**

String via**,**from**,**to**,**callId**,**cSeq**,**contact**,**allow**,**maxForwards**,**

userAgent**,**supported**,**contentLength**;**

public Request**()** //constructor

**{**

**this.**allow **=** ""**;**

**this.**cSeq **=** ""**;**

**this.**callId **=** ""**;**

**this.**contact **=** ""**;**

**this.**contentLength **=** ""**;**

**this.**from **=** ""**;**

**this.**maxForwards **=** ""**;**

**this.**supported **=** ""**;**

**this.**to **=** ""**;**

**this.**userAgent **=** ""**;**

**this.**via **=** ""**;**

**}**

**}**

**REQUEST TERMINATED CLASS**

package udpserver**;**

**import** java**.**util**.**ArrayList**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File requestTerminatedRequest.java

\*/

public class requestTerminatedRequest **extends** Request

**{**

ArrayList**<**String**>** via**;**

requestTerminatedRequest**()**

**{**

**super();**

via **=** **new** ArrayList**<>();**

**}**

public String forwardrequestTerminated**(**String line1**,**String servIp**,**int servPort**)**

**{**

String fwd\_res **=** line1 **+** "\r\n"**;**

**if(**via**.**get**(**0**).**contains**(**","**))**

**{**

String modifiedVia **=** via**.**get**(**0**).**substring**(**via**.**get**(**0**).**indexOf**(**","**)+**1**,**via**.**get**(**0**).**length**());**

via**.**set**(**0**,**modifiedVia**);**

**}**

**else**

via**.**remove**(**0**);**

//add via feilds

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

String modifiedContact **=** contact**.**substring**(**0**,**contact**.**indexOf**(**"@"**)+**1**)+** servIp**+**">"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** modifiedContact **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: 0" **+** "\r\n\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**RINGING REQUEST CLASS**

package udpserver**;**

**import** java**.**util**.**ArrayList**;**

/\*\*

\*

\* @author Rajat Saxena & Shivam Dabral & Biwas Bisht

\* @date 13/Jun/2016

\* @project UDP\_Server

\* @File ringingRequest.java

\*/

public class ringingRequest **extends** Request

**{**

ArrayList**<**String**>** via**;**

ringingRequest**()**

**{**

**super();**

via **=** **new** ArrayList**<>();**

**}**

public String forwardRinging**(**String servIp**)**

**{**

String fwd\_res **=** "SIP/2.0 180 Ringing\r\n"**;**

String modifiedVia **=** via**.**get**(**0**).**substring**(**via**.**get**(**0**).**indexOf**(**","**)+**1**,**via**.**get**(**0**).**length**());**

via**.**set**(**0**,**modifiedVia**);**

//add via feilds

**for(**int in**=**0**;**in**<**via**.**size**();**in**++)**

fwd\_res **=** fwd\_res **+** "Via: " **+** via**.**get**(**in**)** **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "From: " **+** from **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "To: " **+** to **+** "\r\n"**;**

fwd\_res **=** fwd\_res**+** "Call-ID: " **+** callId **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "CSeq: " **+** cSeq **+** "\r\n"**;**

String modifiedContact **=** contact**.**substring**(**0**,**contact**.**indexOf**(**"@"**)+**1**)+** servIp**+**">"**;**

fwd\_res **=** fwd\_res **+** "Contact: " **+** modifiedContact **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "User-Agent: " **+** userAgent **+** "\r\n"**;**

fwd\_res **=** fwd\_res **+** "Content-Length: 0" **+** "\r\n\r\n"**;**

**return** fwd\_res**;**

**}**

**}**

**REFRENCES**

* **https://www.ietf.org/rfc/rfc3261.txt** - RFC3261 Standard for SIP
* **https://tools.ietf.org/html/rfc3665** - RFC3665 Standard for SIP Call flow Examples
* **TCP/IP Sockets in JAVA, Second Edition** : Practical Guide for programmers (The Practical Guides) 2nd Edition by Kenneth L. Calvert and Michael J. Donahoo
* **www.tutorialspoint.com/session\_initiation\_protocol** - Understanding SIP
* **www.phoner.de** - Phoner download
* **Voice over IP Fundamentals (2nd Edition)** : Written by Jonathan Davidson  (Author), James F. Peters (Author), Manoj Bhatia (Author), Satish Kalidindi (Author), Sudipto Mukherjee (Author)