"MARG-DARSHAK" THE IIT NAVIGATOR

Mahesh Kumar
and
Kalyan

Computer Science and Engineering
IIT Bombay
maheshjain@iitb.ac.in
kalyan.k@iitb.ac.in

Oct 30, 2004

Introduction

Goal

MARG-DARSHAK aims to provide shortest and graphical path from source to destination inside IIT.

What is the need??

Presently, people coming to iit from outside (mainly new comers) faces problem how to go to particular place like to a hostel,department building,professors quarters etc. Some people even don't know the exact address,they just know the student,professors or department's name,since iit is very big it's very difficult to find them.

How we can help....

- User can give two type of inputs
  - Source and destination pair
  - Student/professor/department name
- In first case we will show them shortest path from source to destination
- In second case we will give them list of student with other details as department to which they belong,their father's name,email-id,their native place,room and hostel no in which residing.
- For professor we will show the department name,father name,email-id and quater no in which they are residing.

softwares used

- VRML Modeller
- Tomcat Web-server
- VRML stand-alone player
- VRML Enabled browser
- mysql database

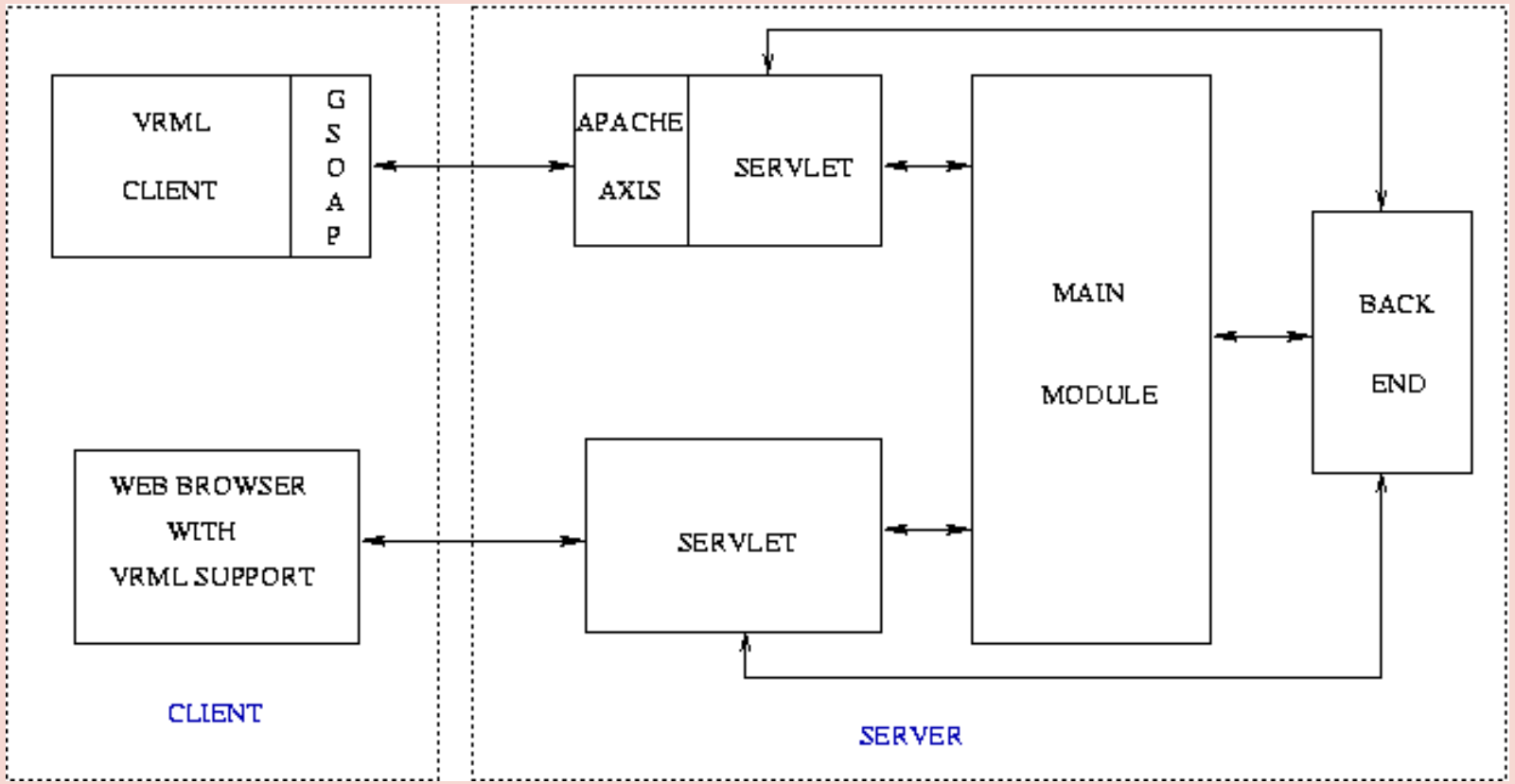
Why VRML??

- Provides interactive 3d view
- Has very strong support for java .
- Easily downloadable in browsers (due to less size)
- it's an open format like xml
- can be used to create an environment or world that appears realistic as you "move" through it
- Allows display of 3-dimensional imagery on the Web
- In a VRML application a user can click on any object to travel to another part of the program or to visit another Web page
- A vector based 3-dimensional modelling language that sends ASCII text files over the internet to be translated by the VRML viewing engine at the other end. VRML is the next generation to HTML.

why soap??

- SOAP is a simple XML based protocol to let applications exchange information over HTTP
- cleaner, better Web integration, more versatile, faster
  - Cleaner: clear processing and extensibility models, increased interoperability.
  - Better Web integration: better integration with XML standards and the architecture of the Web.
  - More versatile: binding framework providing protocol independence.
  - Faster: based on XML Infoset allowing performance optimization.
  - SOAP Version 1.2 is truly protocol independent i.e. messages could be carried by HTTP, SMTP, or any other protocol for which a binding conforms to the binding framework.

DESIGN


VRML
CLIENT
G
S
O
A
P
APACHE
AXIS
SERVLET
MAIN
MODULE
BACK
END
WEB BROWSER
WITH
VRML SUPPORT
SERVLET
CLIENT
SERVER

WORKING

- Our project has basically two parts
  - client
  - server
- Client is of two types
  - Stand-alone client which do not have browser plugin support.
  - vrml enabled web-browser
- Server has three parts
  - Main module
  - Back-end
  - servlet

Client

Stand-alone client

- It will take input from user and pass it to gsoap and gsoap marshall's the data into xml code send it to the server.
- gsoap will take the output generated by the server and gives to the vrml renderer which renders the image.

vrml enabled web-browser

- User data will be taken in a form and passed to the servlet.
- takes the output generated and renders the image.

USER-INTERFACE

Stand Alone Client

- Can add his custom features to the client
- Good for the opensource operating which did not have browser support for VRML
- As this client uses WEB SERVICES the client can be ported to any operating system

Web-Browser with VRML support

- Uses only specific features provided

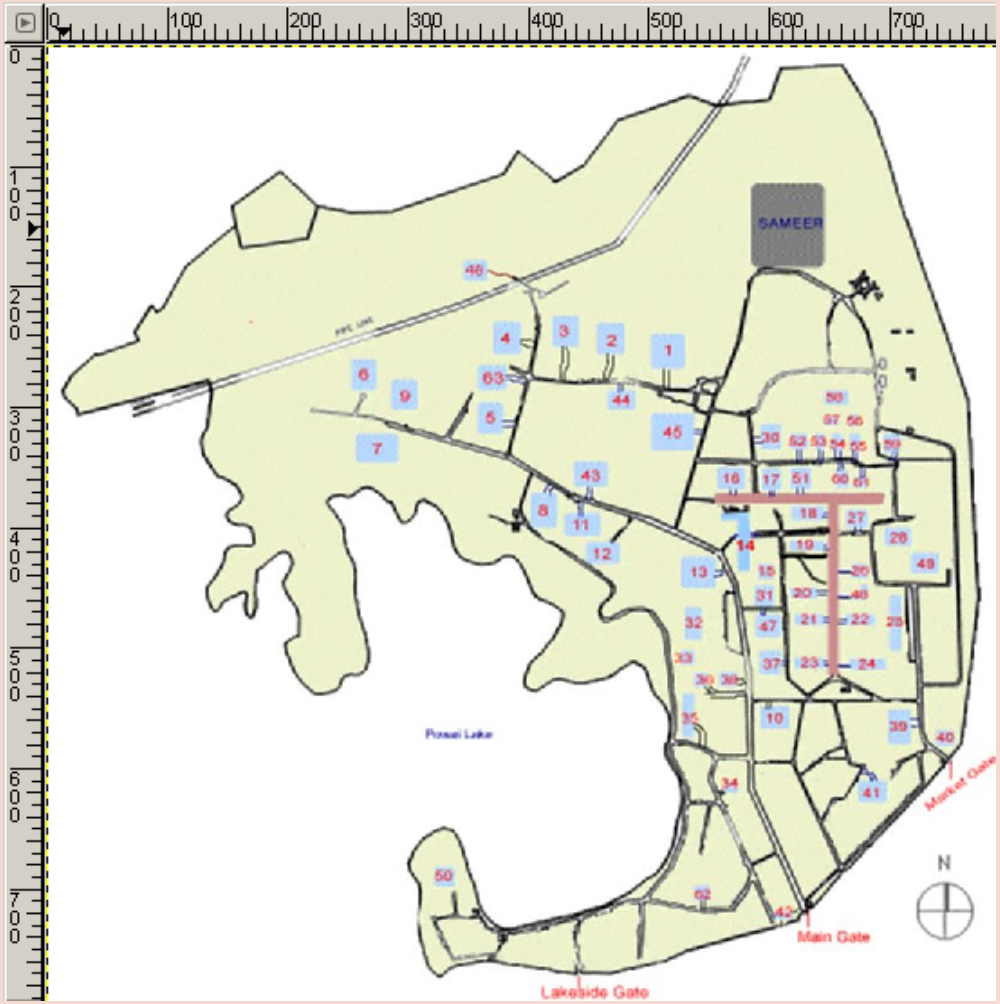
SERVLET

- Servlet is of two types
  - One for Handling web services
  - Other one is web-based
- In web services we are using apache axis which de-marshalls the request and marshalls the vrml code.
- Servlet has two work to do
  - It searches and retrieves the information about student/professor given by the user.(optional)
  - It submits the source and destination pair to the iit navigator module.

Backend

- contains records of student,professor
- contains data about map
- also contains pregenerated fragements of vrml code
- also contains coordinate of source-destination pair

Map of IIT

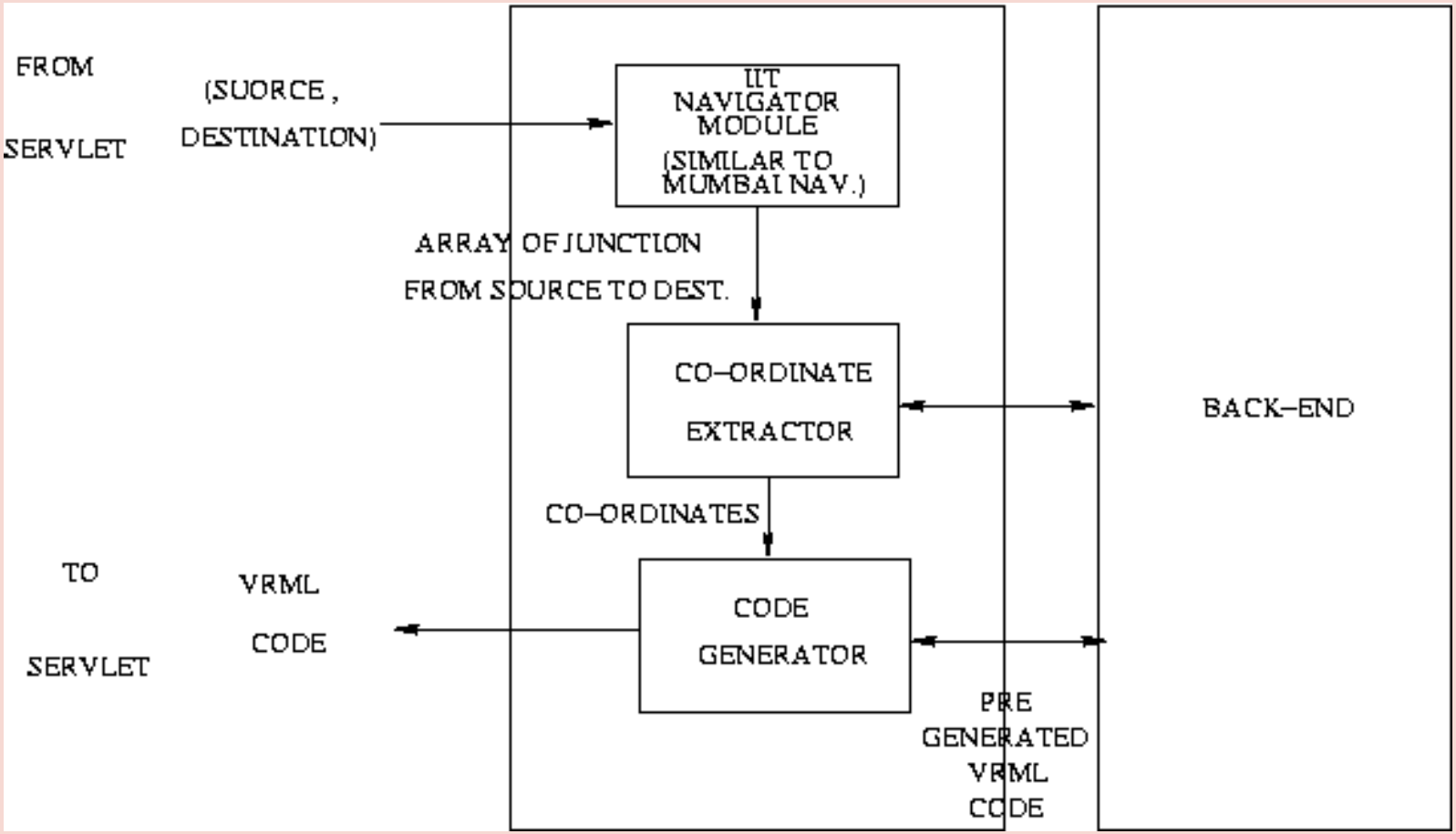


Decoding of the map

The map is decoded and stored as the co-ordinates in the backend (database). Eg :

Location	x	y	rx	ry
Hostel1	513	250	516	285
Hostel2	468	243	464	276
Hostel3	429	237	426	274
Hostel4	381	240	404	252
CSE	622	357	626	346

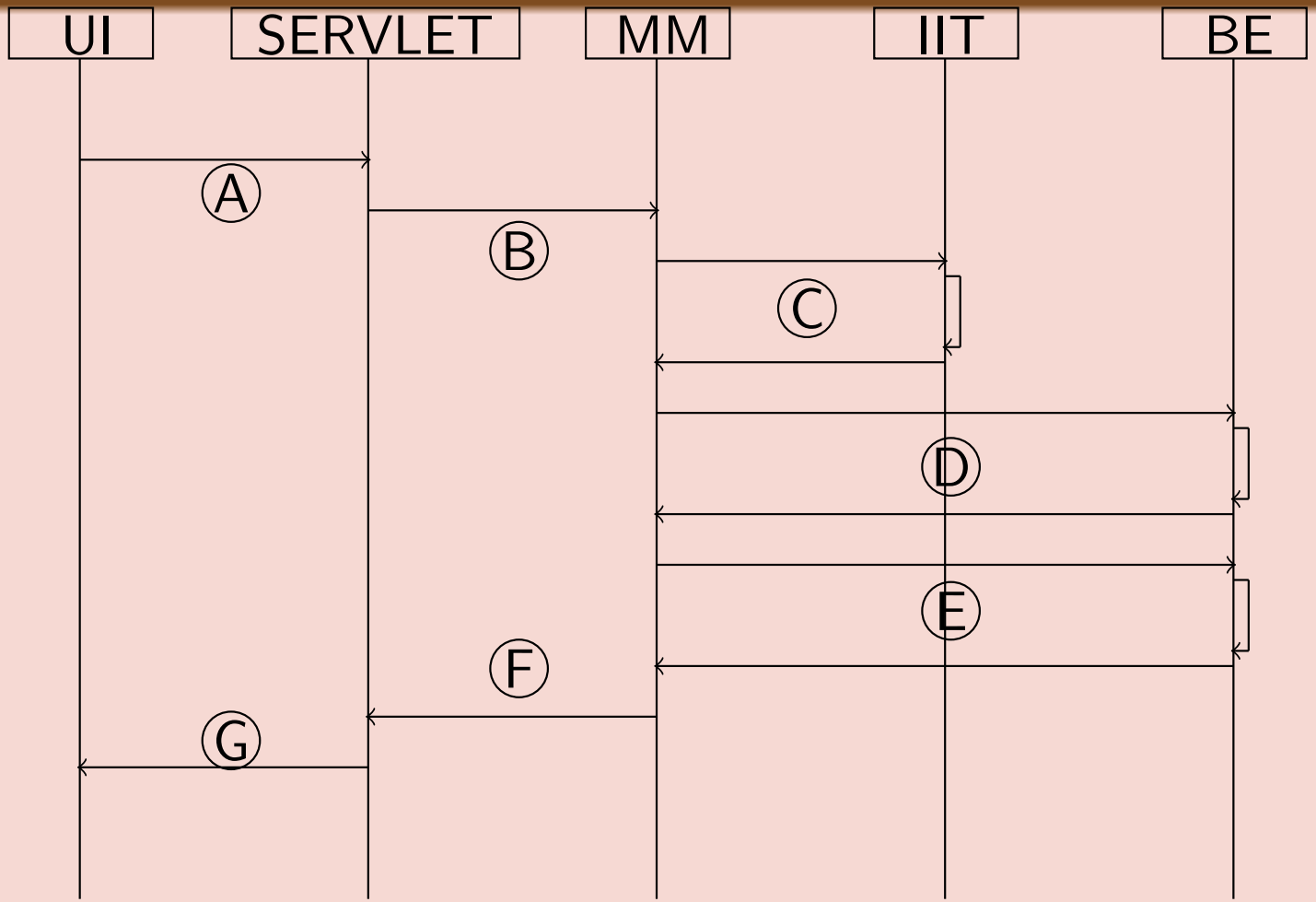
Main Module


FROM
SERVLET
(SUORCE ,
DESTINATION)
IIT
NAVIGATOR
MODULE
(SIMILAR TO
MUMBAI NAV.)
ARRAY OF JUNCTION
FROM SOURCE TO DEST.
CO–ORDINATE
EXTRACTOR
BACK–END
CO–ORDINATES
TO
SERVLET
VRML
CODE
CODE
GENERATOR
PRE
GENERATED
VRML
CODE

Main Module

- Main module has three modules
  - iit navigator based on mumbai navigator
  - co-ordinate fetcher
  - vrml generator
- iit navigator takes source and destination from servlet and gives shortest path between source and destination path means sequence of nodes(junctions shown in iit map for eg 1-13 for hostels etc.)
- co-ordinate generator fetches the exact location co-ordinates and near by road co-ordinates from back end and passes to the vrml generator
- vrml generator calculates the two extremes ends of the recieved co-ordinates and takes tolerence of some pre-defined amount (given by programmer) and generates the vrml code by fetching pre-written vrml codeand then sends it to servlet.

Sequence diagram



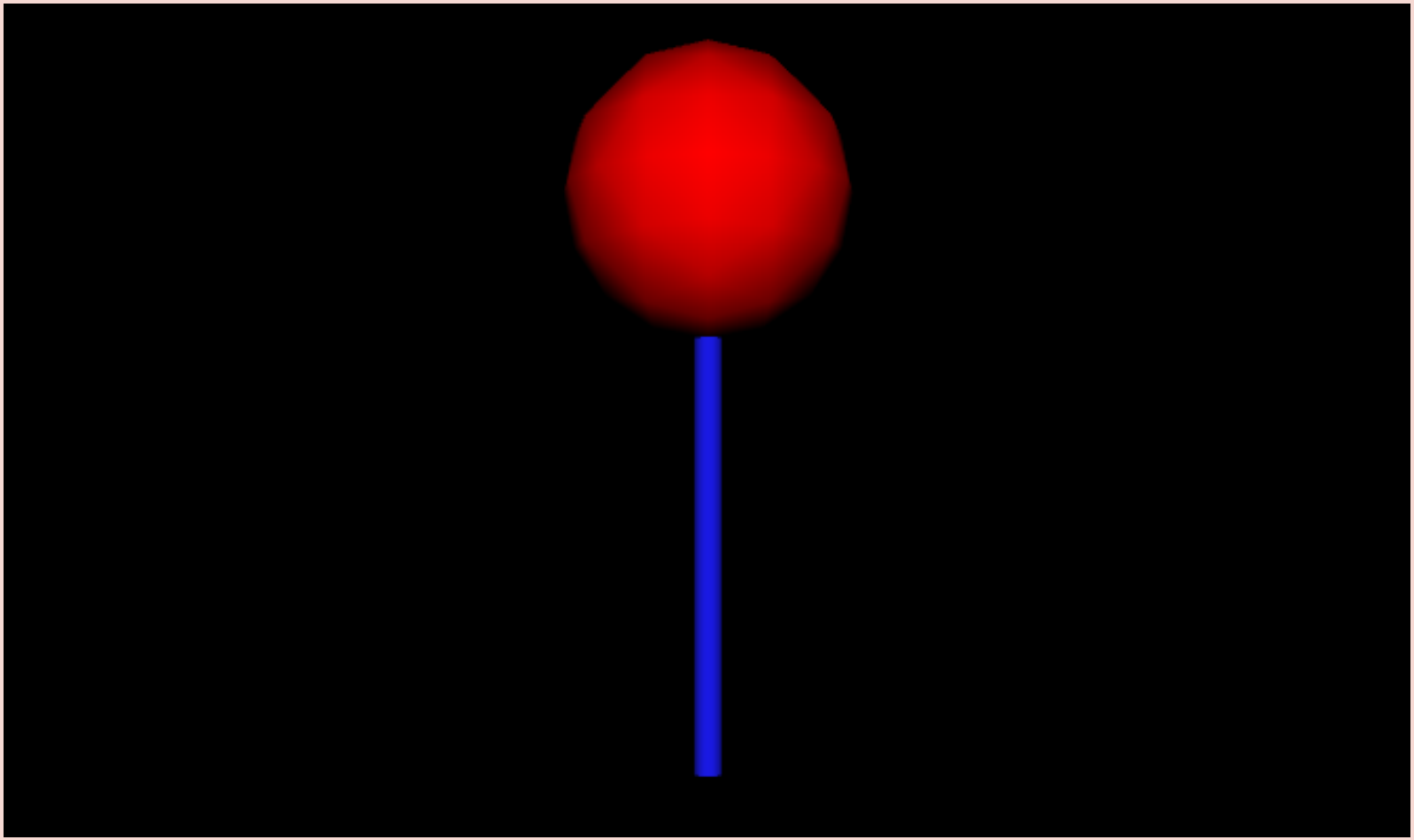
Sequence diagram continued ..

- A : user interface sends request to servlet
- B : servlet sends source-destination pair to the main module
- C : main module sends the source and destination to the iit navigator which return the shortest path from source to destination.
- D : main module fetches all the co-ordinates from the backend
- E : main module fetches the pregenerated vrml code according to co-ordinate fetched and generates the final vrml code
- F : main module sends generated code to the servlet
- G : servlet sends generated code directly (for vrml enabled web-browser) or by using web services(for stand alone client)

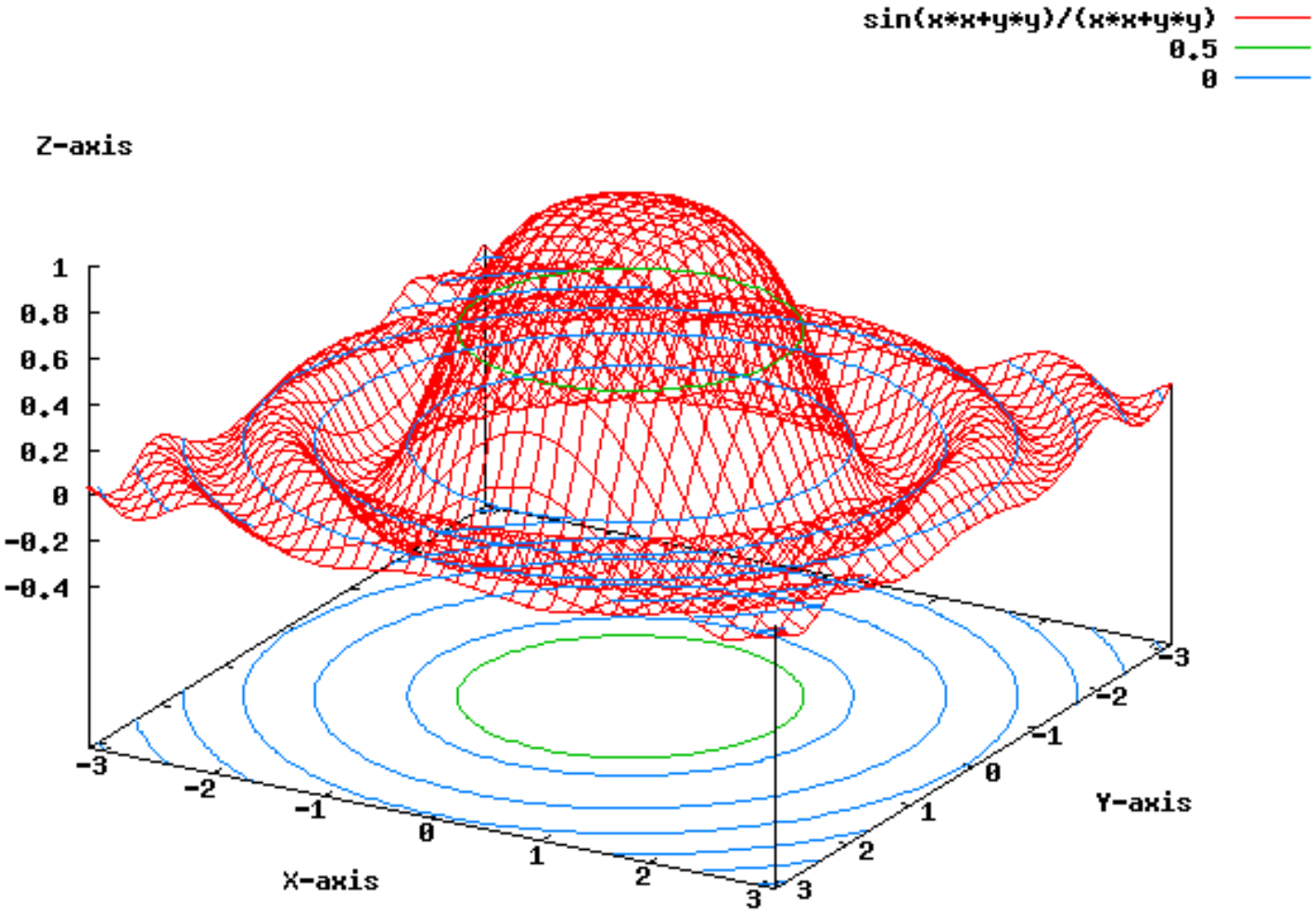
VRML EXAMPLE

```
#VRML V2.0 utf8
Shape {
geometry Cylinder {radius 0.1 height 3.0}
appearance Appearance {
material Material { diffuseColor 0.1 0.1 0.9 }
} }
Transform {
translation 0 2.5 0
children [
Shape {
geometry Sphere { radius 1 }
appearance Appearance {
material Material { diffuseColor 1 0 0 }
} } ]
}
```

VRML EXAMPLE Contd ...



Graph using GNUPLOT



References

- Books
  - *Late Night VRML 2.0 with Java* by Bernie Roehl, Justin Couch, Cindy Reed-Ballreich, Tim Rohaly, Geoff Brown.
- Web Sites
  - http://vrmlworlds.crosswinds.net/links/vrml/vrml_tutorials.html (good links to learn VRML)
  - http://www.geovrml.org (good site to know how the geographical data will be represented in VRML)
  - http://www.vrmlsite.com/ (contains tutorials for Java-vrml)
  - http://cs.ecs.baylor.edu/ donahoo/tools/gnuplot/ (contains GNUPLOT examples)

personal information

Name : K.Kalyan chakrawarthy
Roll Number : 04405901
DOB : 11^{th} Nov 1983
Name :Mahesh Kumar Chopra
Roll Number : 04305810
DOB : 23^{rd} aug 1982