

Implement Bittorrent Client for KolibriOS

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Abstract :

KolibriOS is tiny yet powerful operating system that can run with few megabytes of disk and 8MB of RAM. It boots in less than 10 seconds. It is completely written in FASM assembly language which is the reason for such small memory footprint and tremendous speed.

Bittorrent client is an application that helps to perform peer to peer file sharing using [Bittorrent Protocol](#). Bittorrent client runs on every machine which is involved in downloading/uploading files among peers.

The aim of the project is to develop command line based [bittorrent client](#) application for KolibriOS. The application will be built from scratch as it has not been implemented/ported to KolibriOS yet.

Criteria of Success :

Following is criteria of success I am aiming for :

- 1) Enable user to share file with other peers [Uploading]
- 2) Enable user to download the file from multiple peers [Downloading]
- 3) Provide statistics of download to user periodically [Download Progress]

Work Plan / TimeLine:

The project work plan has been divided mainly in three parts. Milestones has been created based on substantial outcome and not by amount of time required:

- 1) Milestone 1:
 - Decoding torrent file,
 - Getting peer information from tracker server
 - Establishing connection with one of peers.
- 2) Milestone 2:

- Parsing, generating and handling different kind of messages
- Preparing reply for messages

3) Milestone 3:

- Scaling up application in sense of downloading from multiple peers and handling large files for download.

Time line is colored according to milestones. So same color boxes belong to same milestone:

Duration	Description
[April 22 to May 22]	Community bonding Studying existing network function related code Studying existing open source torrent application Learning to write wrapper function for C Preparing more accurate design of my work plan and get it approved.
[May 23 to May 30]	<u>Activities :</u> Decoding bencoded torrent file Extracting meta-info from file <u>Input :</u> Standard .torrent file <u>Outcome :</u> Announce URL of tracker and Info dictionary that provides information about file(s) like Piece Length, Name, Pieces(hash list), Paths
[June 1 to June 14] (two weeks)	<u>Activities :</u> Generating HTTP request for tracker server Parsing HTTP response received from tracker server. Implementing/Integrating hashing algorithm like SHA1. <u>Input :</u> Meta-info extracted from torrent file. <u>Outcome :</u> HTTP Get request (formatted according to bittorrent protocol) IP Address and Port numbers of peers extracted from HTTP response

[June 15 to June 21]	<u>Activities :</u> Establishing connection with one of peers. Selection of peer out of multiple peers is random. As support for multiple peers will be implemented latter. <u>Input :</u> Handshake message for selected peer <u>Outcome :</u> Connection status [Success /Failure based on verification of info-hash]
[June 22 to June 28]	<u>Activities :</u> Identifying 11 different kind of messages and filtering out 'BitField' and 'Have' Kind of messages. Generating and understanding Interested, Choked, Unchoked and Not Interested messages and various combinations of them. Preparing reply message for above kind of messages. <u>Input :</u> Bit Field/ Have + Unchoked message <u>Outcome :</u> Interested message [to be sent to destined peer]
[June 29 to July 5]	<u>Activities :</u> Generating request messages for asking pieces from other peer <u>Input :</u> Available pieces information gathered from Bitfield/Have messages <u>Outcome :</u> Request Message
[July 6 to July 19] (two weeks)	<u>Current Status :</u> So far implementation handled only receiving side of bittorrent client. <u>Activities :</u> Look up / Search for files shared. Generating bitfield, have, choked, unchoked, interested, not interested messages according to availability of file and its pieces. Generating response to connection request. Sending pieces requested and keeping track of the same. <u>Input :</u> Different messages from other peers <u>Outcome :</u> Proper reply messages for other peers
[July 20 to July 26]	<u>Current Status :</u>

	<p>Torrent generally involves transferring large file and hence all pieces can't be kept into memory. And KolibriOS is made for working with low configuration. Hence memory requirement from one application must be low.</p> <p><u>Activities :</u> Writing files to disk periodically. Merges all such blocks at the end.</p>
[July 27 to Aug 3]	<p><u>Current Status :</u> So far implementation handled connecting with single peer for one download.</p> <p><u>Activities :</u> Handling download of file from multiple peers. Maintaining download statistics.</p>
[Aug 4 to Aug 10]	<p><u>Activities :</u> Testing application as whole and fixing bugs if any.</p>
[Aug 11 to Aug 15]	<p><u>Activities :</u> Preparing detail document of code developed as well as writing few test cases to verify implementation.</p>

I have thoroughly researched about the implementation details mentioned in this proposal and have put careful thinking for timeline and duration. Being an active user of torrent application, I am well aware of torrent-terminology and expected outcomes from application.

I have mainly referred following links for developing my work plan :

- [Bittorrent protocol official specification](#)
- [Bittorrent protocol un-official specification](#)
- [Libtorrent](#)
- [Transmission Client](#)
- [qTorrent Client](#)

Code Samples :

Following are relevant code samples that justifies my appropriateness for the project :

1) [Unix Like Shell Implementation in C++](#) :

- Simple shell utility that allows user to execute all external as well as shell-builtin commands provided by linux.
- Provides shell specific functionality like multi-level pipe-line(“|”) support and IO redirection.

2) [Peer to Peer LAN based file sharing system in Java](#) :

- Command line utility that allows to search for peers in local area network(LAN).
- Allows user to share & download files from other peers.

3) [PintOS](#) :

- [PintOS](#) is toy operating system developed by Stanford university for the 80x86 architecture.
- I have completed [Project 1](#) as part of my Operating System course.
- It involved making changes in scheduling and threading functionality of OS.

4) [Simple Color Picker Application for KolibriOS in C](#) :

- Single window application that shows HEX code of color selected
- Used MENUETLIB functions written for C for graphics.

5) [Traceroute Utility for KolibriOS in assembly language](#) :

- Command Line application that lists down intermediate routers/hops for given URL along with time to reach.
- Used IP, ICMP and Network libraries.

6) [Few Documents prepared by me for KolibriOS](#) :

- I have prepared tutorial kind of documents based on whatever I have learned till now for KolibriOS.
- Planning to add more documents as well as convert it to wiki pages/blogs.

About other commitments :

I would have summer break during the project duration and have no prior commitments so I would be able to devote my complete time to the project.

Academics :

I am currently pursuing Masters in Computer Science and Engineering from one of the premier institute of India , IIT Hyderabad. My CGPA : 9.6 [Ranked 5th among 70 students].

I have done following relevant courses in past :

- Operating Systems
- Computer Networks
- Microprocessor and Fundamentals
- Computer Architecture and Design
- Data Structures and Algorithms

Motivation :

This is my very first GSoC as well as Open Source Project experience.

I always found the internals of operating systems fascinating and KolibriOS amazed me with its low requirements on hardware. So I see connecting with KolibriOS as an opportunity to learn more about this area and make contribution to it.

