

Torrent Based Embedded Systems

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Abstract— Today's world is filled with virtually infinite number of embedded systems from smallest toys, to mobile phones and even automobiles. Even though the processing power of these embedded systems has increased several folds over the years, the limited processing power still remains as a drawback for the embedded systems for complex applications and multitasking. In the n future these embedded systems will be highly interconnected with each other via internet. This paper deals with developing a new idea for efficient use of the processing power of these interconnected embedded systems to overcome the limitations in the processing power of the embedded systems.

Key words: embedded systems, M2M, seeding, leeching

I. INTRODUCTION

As the cost of embedding computing becomes negligible compared to the actual cost of goods, there will be a trend towards incorporating computing capabilities and wireless communication into most consumer products. The next generation of computing systems will be embedded, in a virtually unbounded number, and dynamically connected. it may be inefficient to do all the task locally within the embedded system.

As the name suggests the torrent based embedded system is a concept that is adapted from the concept of torrent file sharing. The aim of this torrent based embedded system is to share processing power efficiently among several embedded systems over the torrent protocol. For example when you sleep, major part of your phone's processor remains inactive, this leads to inefficient use of resources. The torrent protocol some other active phone in some corner of the world which is in need of more processing power to use this idle time of your phone's processor .

This torrent based sharing is a cross platform M2M (machine to machine) type sharing. That is, even an idle embedded system present inside a factory can help an embedded system present in your car. Any embedded system that runs an additional specially designed torrent application will be able to become a part of torrent based sharing.

Sharing of resources not only will result in better performance of the embedded system but can also reduce the overall cost of embedded system as the need for high processing power comes down

II. SEEDING AND LEECHING

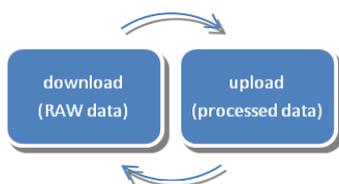


Fig. 1.1: seeding (simple block diagram)

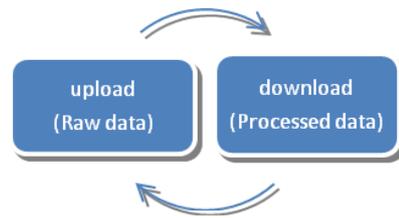


Fig. 1.2: leeching (block simple diagram)

In a general torrent file sharing , upload means seeding and download means leeching but this concept does not apply for torrent based embedded system .

A. Seeding:

A seeder is an embedded system which lends processing power. It first downloads the raw data from the leeching (system that requires processing power) embedded system and processes the data and uploads the processed data back. the block diagram representation of seeding process is given in (fig1.1)

B. Leeching:

A leecher is an ebedded system that is in need of more processing power. It first splits the raw data in to several pieces and uploads the raw data packets to many seeders . (for example a 10 MB data may be transmitted as ten 1 MB pieces or as forty 256 KB pieces) ,the splitting of data

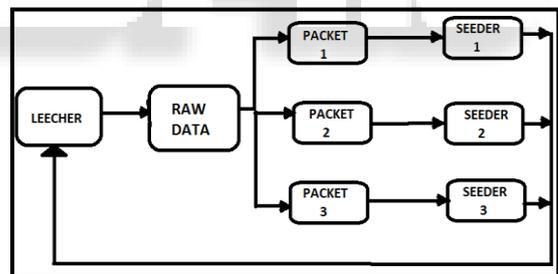


Fig. 1.3: leeching (complete block diagram)

in to packets is done to achive maximum efficiency. The leecher waits till the processing is complete and then downloads the processed data packets back and arranges the packets in orginal order.The simple block diagram of leeching process is given in (fig1.2) and the complete block diagram of this process is given in (fig 1.3).

III. META DATA

The leeching embedded system automatically generates a file called meta data. This self generated file contains the information about the order of the packets and the node address of the various seeders to which the packets have been sent. This meta data file helps in retrieving the processed data back in random order and re arrange in to the order in which the raw data was sent. It is also used to verify that no data is lost in the transmission process.

IV. TRACKERS

These are computer systems that help the leechers locate the best matching seeders. When an embedded system becomes idle the torrent application sends the information about the amount of free processor memory available, to the tracker. Since, there are millions of embedded systems the trackers will receive huge volumes of data about idle processors and the data about free processor space has to be updated every second as the available processor space keeps changing continuously. This makes storing these data a tough task. In this case the latest BIG DATA TECHNOLOGY can be used to process and store this information.

V. MERITS AND DEMERITS

A. MERITS:

- Cost Effective
- Effective use of resources
- Improved multitasking abilities
- improved response time and speed
- reduces the necessity of complex processors

B. DEMERITS:

- Requires a stable high speed internet connection
- Loss of packet during transmission
- virus threat

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