BIRB: Distributed Social Media application over NDN-ICN

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Abstract This proposal discuss on developing a distributed social media - Twitter-like application over Name Data Networking(NDN)[1][11] - Information Centric Architecture (ICN)[12]. It aims to demonstrate the usability of synchronization protocol - ChronoSync[4] and Psync[8] to synchronize data between different consumers and producers develop for the NDN architecture. Producers are the one who produce the data e.g. *The Newyork TImes* , while we - readers are data consumer.

1 Introduction

Name Data Networking is a data-centric internet architecture which uses the concept of naming a content rather than naming a host (192.168.5.75) has been done by the current IP based internet architecture. As stated, every single data released by the data producer in the network is a named content e.g. */memphis/operating system/project/birb.pdf*. To fetch this data, interested consumer will send an interest packet with a name exactly matching the data name over the network. Once the interest is received in the network by a node i.e. routers, routers will check its cache - content store (CS) for the availability of the data. If found in CS, the data is sent back to the consumer immediate on the reversed path followed by the interest. Otherwise, the interest packet is forwarded to the next node and so on. If the data is not found on any intermediate nodes, it will ultimately reach the data producer and hence it will sever the data. The path to the data producer is stored in forwarding information base (FIB) of name-data forwarding daemon (NFD).

BIRB is a distributed social media application aiming to demonstrate the capabilities and usability of NDN and several protocols develop for the communication and data transfer over NDN. Unlike most of the other social media platform, in terms of published data, BIRB is a purely distributed application as all the data shared across the network are stored in local devices of the users only.

"All the followers are consumers, and all the followee are producers, a follower can be a producer and followee can be a consumer"

An estimated sequence diagram of the application is shown in the figure 1. Here, first, a user will send a follow request to some other user. The application(BIRB) will provide a search feature to find friends. It is achieved by storing a list of all the users resisted the application in an intermediate server. This server will provide a capability to find new friends. Once a user follows another user, it will send a synchronization interest to that followed user. Upon receiving a sync interest, the application on the other side will either send a list of all sequence numbers of all the bird (technically data) it has published till date, or store the request in its pending table (PT). The main purpose of PT is to serve every pending interest when new data is produced by the producer. Unlike TCP/IP - push-based system, NDN is a pull-based system. Here, data consumer will pull the data published by the producer. Thus, upon receiving the latest sequence number or list of them, follower (data consumer) will pull all the data corresponding to each sequence number and subsequent store them in a local database. These stored data will be rendered by the application in the application home page. The interest from the data consumer towards the producer is periodic in nature i.e. they are sent regularly in a certain interval. This regular interest is to synchronize a follower and the followee.

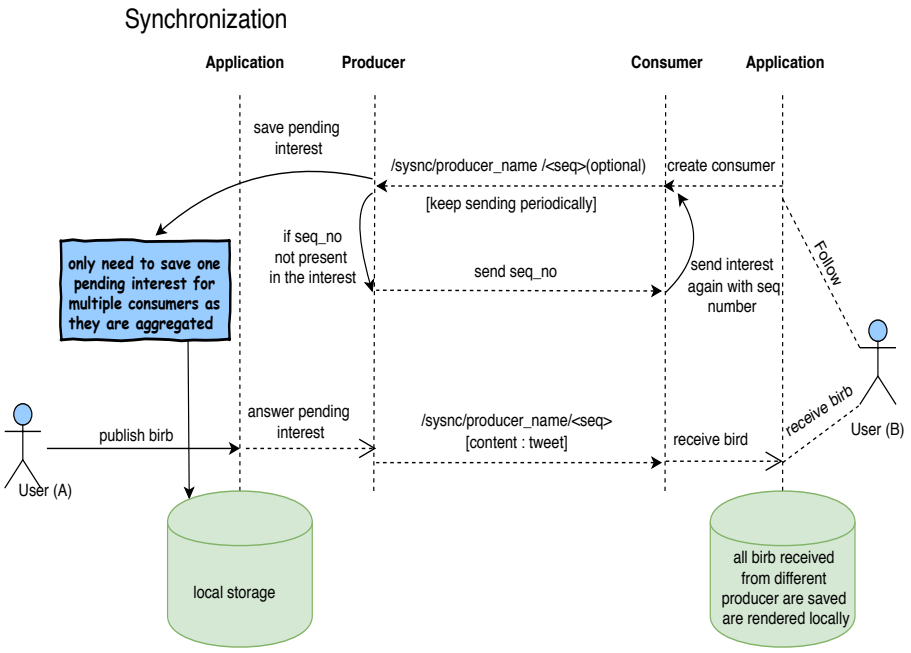

Figure 1: Figure: Sequence Diagram - BIRB

Even the application seems elementary and simple in nature, it should overcome several challenges such as constant developing nature NDN libraries and synchronization algorithms, few and inconsistence NDN testbed[13] nodes, the complicated certification process for the new user in order to perform remote communication and so on. However, upon completion, it will demonstrate several capabilities of NDN data synchronization mechanism and also will provide an example for the real world application development over NDN.

2 Related Works

Few applications are developed in the past similar to BIRB. NDNChat, ChronoShare[10], ChronoChat[6], nTorrent[5] are some of them. Unfortunately, none of these application facilitates remote communication between the users neither they use the NDN testbed. BIRB aims to overcome these challenges and shortcoming. The detail on the previously developed similar application can be found on the reference below.

3 Requirements

A desktop capable of running NDN i.e. ubuntu, mac or android. A user using this application should be able to publish birb (data) and receive birb (data) from the one who is followed by the user. Also, it should render the received data in the application UI. Birb is similar to tweet in twitter. *Note: This application will be developed in Java thus, the user's machine should also be capable of running Java.*

4 Rationals

This project has several notable benefits. As I have mentioned earlier, NDN is a new internet architecture. Its popularity and usability are growing day by day. Several libraries and API are developed to facilitate new application developers and users. There is a 42 nodes NDN testbed currently deployed in several parts of the world. This testbed provides several high-level API for the app developers and the user to communicate over NDN architecture. Upon successful development of this application (BIRB), it will demonstrate the

usability of NDN, NDN testbed and its user in developing the distributed application. This application will also demonstrate the strength of data synchronization library ChronoSync and PSync. It also aims to inspire other developers to come across the NDN and develop a real-world application using it. Currently, there exists very few application developed for NDN.

References

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