20180705 PingER Team Meeting

Time & date

Thursday, July 5th 9pm **Pacific time; Friday, July 6th, 2018** 9:00am **Pakistan time; 12:00noon Malaysian & Guangzhou time; and** 11am **Thailand time.**

Format

New items and updates are in bold face.

Coordinates of team members:

See: http://pinger.unimas.my/pinger/contact.php

Need to add Umar - Johari

Attendees

Invitees:

Wajahat Hussain (SEECS)+, Saqib+ (GZHU); Johari+ (UNIMAS); Adib? (UUM); Fizi Jalil (MYREN); Dr. Charnsak Srisawatsakul? (Ubru), Les+, Bebo+, Umar+

+ Confirmed attendance

- Responded but Unable to attend:

? Individual emails sent

Actual Attendees

Wajahat, Saqib, Johari, Charnsak, Les, Bebo, Umar

Saqib had problems with his connection and was able to hear but not be heard.

Others

Administration

- Membership of pinger-my in https://groups.google.com.

Amity (Updated 5/28/2018)

- **We are unable to gather data from the Amity MA, or even ping it, emails sent May 28th and June 3rd, 2018, June 30.**
- The Android version of the PingER MA
    - **email sent June 5th and again June 30th**:
        - **Now that you have support for regularly updating the Beacons, one of the next things is to think about is how to get the data to the repository/archive (SLAC).**
          A possibility is outlined in https://confluence.slac.stanford.edu/display/IEPM/Proxy+support+for+PingER. Perhaps your team might be interested in pursuing step 1. If necessary we could also think about providing an account at SLAC to enable a student **to work on step 2.**
        - **The students have gone on the summer break, they will be back by the 2nd week in July.**

Thailand (Updated 7/5/2018)

For his IPv6 monitoring site pinger6.ubru.cs.ac.th **Charnsak has a pinger.xml configuration file with over 160 IPv6 targets. However, there is a huge discrepancy since according to pingtable.pl there are only about 13 targets responding. We need to get the latest pinger2.pl measurement agent script installed at Ubru so we can get better logging and see why the other hosts are not being monitored. Les and Charnsak are working on this.**

Charnsak is looking at a host in Champasak University, Chan Parsa province in Laos as a potential site for a PingER MA. Charnsak just got approved to make contact with the Champasak University. He expects to set up the MA in the next 4-5 months (say towards end 2018). It also depends on the partner university, **and there may be a lot of paperwork.**

UNIMAS (updated 7/5/2018)

Need to add Umar Kalim to http://pinger.unimas.my/pinger/contact.php. Johari can't ssh into the server so he will go to it on Monday. He will also upload the new UNIMAS PingER website next week.

UUM (Updated 7/5/2018)

Les has sent Adib updates to Figs 3, 4, 5 to extend out to 2018. This is for the paper Socio-economic Development Indices and Their Reflection on Internet Performance in ASEAN Countries

Adib will submit the paper to World Development: https://www.journals.elsevier.com/world-development

NUST: (Updated 7/5/2018))

No intern has joined Wajahat's Lab. So there is not much progress. T**he students are away on summer vacation so no progress.**

Wajahat proposes to get a list of the new Universities in Pakistan and contact them encouraging them to participate in PingER and set up MA. They have made a list of new university sites, communications networks, Labs in different regions of Pakistan (especially the remote regions) and will make contact.

- The list of new universities is ready. Just need resources to engage them.
- Unsure how this is affected by lack of interns.

Discussion item:

Wajahat is hoping to get few students to work on Master thesis related to pinger data. If possible kindly share ideas related to data analytics which he can share with students.

Wajahat also asked last time:

- "Has any work gone into to predicting the cause of failures(blackout, flood, coup (Turkey)) using pinger data?"
- Les> there have been several case studies looking at the impacts of failures, however nothing on predicting failures. I am not sure how one might use PinGER to predict the cause of a failure. For some cases (e.g. earthquakes, tsunamis, flood, coup), it is unclear to me how Network performance monitoring could add to other means of predicting the cause.
- Wajahat's thinking is along the lines of "Regarding other sources, I was thinking, internet is the pulse of digital world. Other sources require additional setup that might not be a possibility in developing countries. Internet being a necessity and having other uses is still prevalent in these developing countries. Can it be used as a real time sensor."
- Again I am forwarding the question in case others in the team may have some suggestions? Below are some responses:
  - Umar mentioned the use of dark fibre testing (e.g strain) and monitoring for earthquakes. There was a recent paper.
- **Umar was thinking that using the PingER data to detect and log anomalies and create alerts might be interesting. This would include triaging the logs into 3 tiers of alerts:**
  - **Low = Information;**
  - **Medium = needs action but non-critical, create a ticket to be looked at later;**
  - **Severe: e.g. wake someone up.**
- **It requires hysteresis so one does not get continuous alerts** for **say something that has gone down.**
- **This makes a lot of sense for say routers and switches which are usually very critical.**
- **The PingER measurement script (pinger2.pl) has a lot of logs that are prioritized by severity (e.g. target not responding for various reasons for the last n runs of pinger2.pl.)**
- **Tiering of events into alert levels would be the focus of the research**
- **PingER might be an interesting field to try out the marshaling of events and categorizing into alert levels/tiering.**
- **Possibly mine the data with say Splunk.**
  - **Umar looked at this: Splunk would be useful for rudimentary for simple scenarios, but not for detailed work.**
- **Might be an interesting project for an MS or PhD student.**
- **For PingER it might include correlation with feeds from elsewhere (e.g. earthquakes, tsunamis, social unrest)**
- **Prediction/tracking:**
  - **For unexpected events such as earthquakes/tsunamis, it is doubtful PingER data would be useful for predictions**
  - **For situations that are developing such as hurricanes, civil unrest: knowing roughly where it is developing might make it possible to temporarily increase the density of targets in the region.**
    - **To do this would mean having a lot more targets available worldwide ready to be monitored.**
    - **One would need to be careful to ensure that the extra monitoring does not interfere with Internet access in the area.**
  - **This tracking might be very valuable for less developed areas where there may be few other (non-PingER) measurements available. However, it can be hard to find the coordinates of ping responding targets is such areas. This would need to be one of the tools developed.**

SLAC was unable to gather data from:

- 121.52.146.180 (kohat.edu.pk) down since Nov 22/2017. Wajahat recommends continuing at least until the new student is up to speed (3/8 /2018). No data available 3/24/2018.
- cae.seecs.edu.pk last time we were able to gather any data was February 27th.
- pinger-ncp.ncp.edu.pk pings but can't gather data 8/11/2017 and 9/16/2017. Contacted. Pings but can't gather data 10/24/2017. They are in the process of restoring 1/17/2018. Still down February 28, 2018, await new student. (3/8/2018). No data 3/24/2018.
- pinger.isra.edu.pk unable to gather data since 3/6/2018, also does not ping.
- **Wajahat says they will get these nodes up. These have been good nodes. They just need the weekly push. NUST will push them soon**. A ny update?

UAF/GHZU (Updated 7/5/2018))

Les has implemented, and we are now successfully using the anonymous FTP server at SLAC as a proxy for gathering data from GZHU MA in Beijing. This gets around not being able to 'get' the data via the web from the Beijing MA, due to blocks. This may also be relevant for PingER on Android gathering of data, email was sent to Amity.

Looking into moving PingER to a "blockchain" database good for decentralizing distribution of data. Monitoring sites would then be able to write to a distributed ledger. This would change the architecture to a more peer to peer architecture. It helps with continuity of PingER since reduces dependence on a single site (SLAC). See BlockChain in Future PingER Projects. Bebo sent several references to Saqib who has looked at them. We could start with real-time data without including the whole archive, i.e. in parallel to the continued centrally managed archive. It would be a private Blockchain and hence not be as compute intensive as a public blockchain. Bebo's impression is that Saqib will lead in putting the ides in his paper into practice. Saqib will need some students. Saqib's boss is going to the NY City meeting.

Discussion item

Saqib sent an email to the team:

In early years of PingER, the framework was designed to check the latency and other Internet performance metrics between CERN and SLAC to facilitate the data transfer between the two sites.

I am thinking, is there any possibility to use PingER to monitor the health of the Bitcoin blockchain network? Since the latency is critical in Bitcoin blockchain network as all the incentives depend on the propagation of transactions and mined blocks. Thus, I am only interested in measuring the latency to check its effect on the propagation of the transactions and mined block among different mining pools. I think if we can do such thing on a historical basis as PingER already does for the Internet, it will increase the worth of the framework and its usability.

Maybe a few test experiments can guide us to a good research paper. I am not sure about the feasibility idea, therefore, need your kind feedback

Umar responded:

"This is an interesting idea. I would like to think about it a bit more thought before I respond at length.
From what I gather, nodes in the network may appear and disappear without notice. Therefore, it is safe to assume that the network state is changing at all times. I wonder, what is it that we would be measuring, for it to be meaningful. Would it be the latency between full nodes? Would it be the latency from a PingER monitoring node to the full nodes? Would the monitoring nodes be representative of typical clients? Is latency the metric to measure? What are all the projects that measure latency or other metrics? (The bitcoin nodes project is interesting, which shows the size of the network. Similarly, the project that measures average-transaction-completion time is relevant. As you pointed out, the bitcoin stats about data exchange are relevant too.)
Thank you for sharing the URLs. I will think about it a bit more and get back to you."
Bebo emailed:

- ***More and more I am convinced that we could identify an interesting and relevant project taking advantage of our PingER experience and involving Blockchain technology.I also think that it may be possible for us to get funding/grant money for such a project which might clearly draw the attention of Blockchain entrepreneurs, conferences, and publications. It might also allow us to attract the collaboration of other institutions and/or universities that might otherwise have not been interested in the basic PingER goals and technology.***

Though the transactional latency is important especially for achieving consensus, most of the latency is computational that is much greater than the communications latency. Possibly PingER RTT could be included in a measure of BlockChain health and status. Bebo sent a reference (https://mastanbtc.github.io/blockchainnotes/consensustypes/) pointing out milliseconds may make a difference to miners to get rewards which is **important for BlockChain cash**
Saqib sent email of an analysis of the impact of various RTTs, see https://ethereum.stackexchange.com/questions/18201/does-network-latency-significantly-affect-mining-rewards.
A possible problem is finding the IP addresses of the bitcoin miners. Bebo dug up a URL showing how it can be done, it is at https://bitcoin.stackexchange.com/questions/66260/finding-ip-addresses-of-all-bitcoin-miners.
Bebo will get together with Umar and Les at SLAC on Monday the 9th around noon to discuss Bitcoin/Blockchain to do some education/brain-storming. Unfortunately noon PST is 3:00am China time. We will try and send Saqib an executive overview of the discussion

PingER at SLAC (Updated 6/7/2018)

Umar looking at extending the comparison IPv6 vs IPv4 ping RTTs and TCP vs ICMP/ping RTTs.

- See Towards Analysis of ICMP vs TCP Ping Latencies - Umar
  - Looked into Traffic Differentiation - Rate Limiting vs. Traffic Prioritization (QoS)
    - Conclusions:
      - Min RTT essentially reflects fixed delay, while average RTT subsumes variations and path load
      - TCP Segment drops manifest as large increases in delay
      - QoS can be implemented in at least two ways:
        - When priorities are implemented, ICMP packets will only be dropped if ICMP quota is full and link is congested, otherwise ICMP traffic is allowed to go beyond quota
        - When rate-limits are implemented, ICMP packets will be dropped when ICMP quota is met, even if links are not congested
      - Path loads dictate latency estimates: With weighted QoS implementations, loaded links depress ICMP
    - Found relevant papers and technical reports. The intent here is to understand the components of latency to help with the evaluation.
      - Y. Zhang, N. Duffield, V. Paxson, S. Shenker, On the Constancy of Internet Path Properties, in ACM SIGCOMM Internet Measurement Workshop 2001
      - A. Acharya, J. Saltz, A Study of Internet Round-Trip Delay, Univ of Maryland, Tech Rep. CS-TR-3736
      - M. Allman, V. Paxson, On Estimating End-to-End Network Path Properties, in ACM SIGCOMM 1999
      - V. Paxson, G. Almes, J. Mathis, Framework for IP Performance Metrics

        - Setup NeuBot and experimented with tests but wasn't able to find useful examples of traffic differentiation (see https://www.measurementlab.net/tests/)
        - Skimmed Glasnost to understand traffic shaping (see http://broadband.mpi-sws.org/transparency/glasnost.php and https://github.com/marcelscode/glasnost)
        - [Not Relevant] Miscellaneous notes on ICMP Traceroutes, MPLS tunneling & ICMP (see http://cluepon.net/ras/traceroute.pdf), Measuring Performance
    - IPv6 results gathered using ping-vs-tcp.pl script. About 56 nodes with IPv6 addresses, 14 of which responded with Npings
    - IPv4 results gathered from SLAC and Virginia Tech
        - SLAC's batch may be downloaded here (approx. 24 MB)
        - Skimmed results; findings are pretty much the same as before
- Pending
    - Identified relevant events in the network stack that highlight timing (_RECVFROM, _RECVMSG, _IP_RECV, _NETIF_RX etc.). Looking for instrumentation that enables us to measure timestamps. We also need to figure out how to determine whether ICMP & TCP traffic are treated differently? and then how to measure the difference?
        - perf-tools allows us to measure transport events
        - If we could assume that the path for ICMP & TCP through the network is the same, then the only difference between two (controlled) tests would be the time spent in the transport layers. This can be measured using perftools.
        - However, such measurements must be made in a controlled environment where ICMP and TCP are treated the same. (I say so because some results — e.g., in East Asia and South Asia — clearly show that ICMP performs much worse than TCP.)
    - We would also need to cater for cross traffic and queuing delays. Given how small the differences are, one may argue that the variations in measurements are due to cross traffic. Perhaps we should start with controlled tests and then see if real world measurements reflect similar behavior.
    - We need to setup a test environment. We can either setup a bare-metal box or use a VM.
        - I will see if I can arrange for a bare-metal box.

PingER IPV6 support

- **PingER now seems to be fully IPv6 capable and stable, the logs have been improved to make it easier to debug problems.**

Host	State	last seen	Status
pingersonar-um.myren.net.my	**No response**	**6/26/2018**	**Pings**
pinger-ncp.ncp.edu.pk	pinger-ncp.ncp.edu.pk down	Nov 29, 2017	
121.56.146.180 (pinger.kohat.edu.pk)	Down	Nov 22nd, 2017	
cae.seecs.edu.pk	Down	Feb 27, 2018	
pinger.isra.edu.pk	Down	March 6, 2018	
pingeramity.in	It was partially working. Now working on missing beacons.txt file and missing data (i.e data disappears a few hours after it is measured and saved at MA). Also it is unable to access http://www-iepm.slac.stanford.edu/pinger/beacons.txt. **Awaits Amity.**	April 27, 2018	

Bebo

Discussion

Bebo sent email**:**

More and more I am convinced that we could identify an interesting and relevant project taking advantage of our PingER experience and involving Blockchain technology.

For example,

https://bitcoin.stackexchange.com/questions/66260/finding-ip-addresses-of-all-bitcoin-miners <https://bitcoin.stackexchange.com/questions/66260/finding-ip-addresses-of-all-bitcoin-miners>

I also think that it may be possible for us to get funding/grant money for such a project which might clearly draw the attention of Blockchain entrepreneurs, conferences, and publications. It might also allow us to attract the collaboration of other institutions and/or universities that might otherwise have not been interested in the basic PingER goals and technology.

Thoughts/responses?

Next Meeting

Next meeting: Thursday, August 9th 9 pm Pacific time; Friday, August 10th, 2018 9:00 am Pakistan time; 12:00 noon Malaysian & Guangzhou time; and 11 am Thailand time.

Old information

GZHU China - Saqib (moved here 7/2/2018)

Saqib submitted the Camera ready paper on "A Blockchain-based Decentralized Data Storage and Access Framework for PingER" and it has been accepted in Trustcom2018.

Two previously accepted papers are now online on the following links.

- The paper titled "Detecting Anomalies from End-to-end Internet Performance Measurements (PingER) using Cluster-Based Local Outlier Factor" is online on IEEE portal. https://ieeexplore.ieee.org/document/8367380/ . This paper is not available in SLAC repository. Les will follow up.
- The paper titled "Internet Performance Analysis of South Asian Countries using End-to-End Internet Performance Measurements" is online on IEEE portal. https://ieeexplore.ieee.org/document/8367431/ . This paper is available in SLAC repository (http://www.slac.stanford.edu/pubs/slacpubs/17000/slac-pub-17205.pdf). However, without doi no and other necessary details. Les will follow up.

NUST (moved here 6/29/2018)

There is an upcoming grant call for projects between Pakistan and the US. Topics may be focused on cybersecurity, health, and education. It has not been announced yet. Wajahat will get the details and share them with the team as soon as they are available. It is interesting since getting a US partner appears to be a roadblock for many potential Pakistani responders. However, the topics may not be very related to PingER. NUST is looking at applying to set up a cyber lab. Getting the funding will be in competition with other Pakistani Universities. For cyber the main things we could think of from PingER were: quantifying what fraction of hosts block pings, punching holes in firewalls to allow pings, how to misuse ping (e.g. ping-of-death, or using anomalous ping packets to deduce the OS etc. flood pings for DOS), the host can respond to ping but applications do not work. Fear of misuse of pings can result in the system administrator, network administrator or cybersecurity blocking pings. A possibility might be a study of what fraction of say working www/dns etc. apps (i.e. checking if a host responds to the relevant port) do not respond to pings. This could be by application, by country or by region etc. Also how to protect a remote pinger traceroute or server from being used in DOS attacks. As of 3/27/2018 there is no call so far. There was one last year, so Wajahat is expecting one. Emailed Wajahar 6/3/2018 asking for update. He responded "There is no call yet. There was one last year. May be change in the US-Pak policy. Just a guess."

UUM (moved here 6/29/2018)

Adib, Bebo, Les met with Southampton Web observatory person. There seemed to be enthusiasm. Adib was going to send some materials to Southampton. The person at Southampton gave us some links. Adib is in the early stages of exploring what web observatory data to link with such as business context indicators, social media and government sites. There was no update 3/29/2018, or 5/3/2018.

GZHU (moved here 3/8/2018)

Saqib submitted a project in CERNET to monitor the performance of IPv6 network using PingERv6. He received the news that the project is accepted with 100K RMB. Now he has 2 accepted projects regarding PingER and total amount he has is near about 40K USD. Further, in his lab, three U1 servers have already arrived through another grant for research purpose. We can also use them for our PingER project.

Therefore, the CERNET has given Saqib a IPv6 based CentOS 6.8 machine in cloud. Now he is trying to deploy the PingER server on the machine. Let's see how it will work on IPv6 based network. This is a 2-year project.

Saqib has made contact with John Pickard author of "Quality of IPv6 Enablement of Universities: An International Study" who has provided a list of about 125 Universities in about 60 countries hosting IPv6 sites. However many are proxies. Les has suggested using perfSONAR (there are about 1000 and they all have lat longs in the perfSONAR database. Saqib is gathering the list, then we will see how many have IPv6 addresses.

The paper title: " Missing Values Imputation in PingER Internet End-to-end Performance Measurements using k-nearest neighbors (k NN)" was not accepted in IMC 2017. He is updating the paper according to the reviewer's comments. Hopefully, Saqib will submit it at some other venue. Not yet decided on the submission venue. Need some suggestions. Updated but not decided where to submit. Update 12/4/2017?

Currently, no data is available on PingER on Android due to unavailability of the live IP address. No update 4/19/2017, 7/6/2017. Email sent to Sara Masood. No update 9/24/2017. Any update 10/24/2017. No progress 1/18/2018.

GZHU (moved here 1/15/2018)

PingER has valuable historical data for the last 20 years.Many analysis and case studies have been carried using this data. A lot of information is available on the website. Saqib's idea is to publish the brief summary all these analysis through a survey paper covering the history and utilization of PingER data starting from 1998 to 2017. Saqib started on it, Les is providing assistance. Need your feedback on the idea of Measuring the Digital Development of the Countries using PingER data. Is there something you want me to review some, e.g. some draft document on Measuring the Digital Development of the Countries using PingER data , or are you asking if it is a good idea to review and create such a document. If the latter I think this is a fascinating subject. Part of the challenge is the chicken and egg problems: i.e. is it network performance influencing advancement of the country, or is it the reverse that advanced countries can afford good networks. My belief is it goes both ways. Also one needs to extend the analysis beyond just Africa else it's kind of a repeat of Pinging Africa , R. Les Cottrell, IEEE Spectrum February 2013. Also see A Simple Tool for Measuring Digital Development , by R. Les Cottrell, IEEE Spectrum February 2013. This is derived from SLAC-PUB-15333.

UUM (moved here 10/24/2017)

"BIND: An Indexing Strategy for Big Data Processing" that uses PingER data. Submitted and accepted by the 2017 IEEE Region 10 Conference (TENCON) that takes place in November. In Penang Malaysia

GZHU

The paper title: "Detecting Anomalies from End-to-end Internet Performance Measurements (PingER) using Cluster Based Local Outlier Factor" is submitted in ISPA 2017 (http://trust.gzhu.edu.cn/conference/ISPA2017/). It has been accepted as of 9/17/2017.

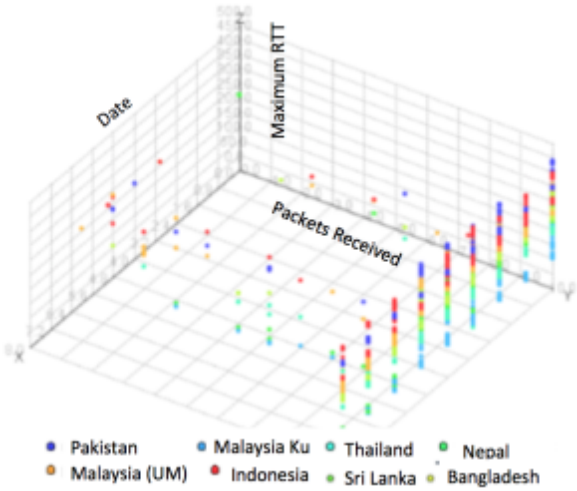
The thesis of Aqsa Hameed title “Applying Data Mining and Visualization Techniques on Pinger Data” is published in ODBMs.org and is accessible through http://www.odbms.org/2017/07/applying-data-mining-and-visualization-techniques-on-pinger-data/

SEECS (moved here 9/19/2017.)

- Aqsa who was working with Saqib submitted "Applying Big Data Warehousing and Visualization Techniques on pingER Data", Aqsa Hameed, Dr. Saqib Ali, Dr. Les Cottrell and Bebo White, to BDSEA 2016.
- I see it is available from ACM online on the following link: http://dl.acm.org/citation.cfm?doid=3006299.3006337 for $15.
- This might be useful to Wajahat's student.

Amity (moved here 9/16/2017)

Preparing a paper on the impact of the cyclone Verdha that hit the Indian coast along with many countries like Thailand, Sri Lanka, Malaysia, Maldives on December 6th. They use K-Means clustering (see https://en.wikipedia.org/wiki/K-means_clustering) to identify anomalies in packets received (inverse of loss) and maximum RTT. Note that for December 7th the reduction in packets received.



Amity (moved here 5/18/2017)

From: Aayush Jain <aayush.2896@gmail.com>

Sent: 24 March 2017 12:31

To: A. Sai Sabitha; harysinha@gmail.com

Subject: PingER Android Team

Abstract for PingER on Android

Progress Made So Far

So far Shivnarayan Rajappa and Rohan Sampson’s team have succeeded in making a bare-bones Android Application that can ping beacons, parse data, and generate a text file in a format specified by SLAC ready for uploading. The proposed model involved the application pulling the beacon list from SLAC’ s servers for pinging. However, the present application has a small percentage of the beacon list hard-coded into the application. As of now, the link between the application and proxy server has not been established.

Future Plans

The new team members are:

1. Rohit Raj

2. Shagun Seth

3. Savy Gupta

4. Aayush Jain

5. Tanuj Saraf

Owing to the advancements in Android technologies during the time of development of the project, our team believes that we can create a more capable and robust application for this project. This involves rewriting the entire application from scratch.

We also propose to create a proxy server that can act as an intermediary between the Android application and SLAC's servers. The proxy server would thus allow handling multiple hosts for greater data collection.

Approach

Our team plans to start off by completing the work on the Android app within 20 days. We will recreate the entire app, with an improved workflow for greater stability. The app will parse the beacon list from SLAC's servers and save as an XML on the device. The data generated after every ping will be appended to a file after cleaning it up with RegEx matches. We first plan to test the app with only a few members of the ping list (which will later be expanded to auto-update in its entirety).

Once we accomplish our work with the app, we will move on to the task of establishing a proxy server. Our entire team will focus on the components of networking, host management, host authentication, file synchronization, and security.

By the end of the project, the server will be able to handle multiple hosts which would all forward it data, and it would in turn reorganise it again for SLAC's servers to pull.

Amity (moved here 4/13/2017)

- The paper on Implementation of PingER on Android has been accepted by IEEE Section. The paper to be online will take 5 months.
- Students are very interested in working with different projects. They have divided the students into three batches (each batch has min of 4 students). The projects currently they are working are:
    - android,
    - data analysis(vardha cyclone)
    - and bigdata

Amity (moved here 3/12/2017)

The students successfully presented the paper on the PingER implementation on Android.at the confluence 2017 conference.. The paper is submitted to IEEE section.

Tropical cyclone Vardah hit Chennai in India on the Dec 13th. It impacted the Internet, in particular one of Airtel's undersea cables. Les sent email to A. Sai Sabitha to see if PingER from Amity could see any effect.

- During the next 6 months their research will study the impact Vardha cyclone that hit the Indian coast(South India/Chennai) and a few other neighboring countries in December 2016 as seen bu PingER.
    - The idea is to study and analyze the PingER data during the corresponding time frame and deduce significant trends and patterns from the data using
    - 1. Clustering techniques
      2. Time series
      3. Correlation and Regression concepts

Amity - Java approach (A. Sai Sabitha and Shivnarayan Rajappa)

1. They are using the native java tools, they are not running the pinger2.pl <http://pinger2.pl> script on android since the native java tools have the following advantages
    a. easier for user,
    b. no need for prior installation of any software, e.g. load perl interpreter which may require missing skills, especially for a non technical user
    c. doesn't need a rooted phone
    d. only the apk needs to be installed to run
2. They have fixed the final sequence number change by using regex, and pushed these changes to github repository.
3. They have installed apache tomcat in the server and plan to use a java file on the server which would connect to the phones that send the request. This java file will then take the input stream received from the phone and write the output stream to a file that would be stored on the server. We are facing some problems regarding a blocked port that is not allowing the phone to connect to the server we are currently working on resolving the issue.
4. SLAC can then regularly pull these files which would be stored based on the month they are received.
5. The Android students have started writing a paper on " implementation of pinger on android " .
6. Next steps:

    a. Extend the target list by getting the Beacon list from SLAC. It is at http://www-iepm.slac.stanford.edu/pinger/pinger.xml on a regular basis and updating the <BeaconList> section at their site. This was part of pinger2.pl.
    b. Also they will need a utility to clean out old recorded data (say older than 3 months), since it will be gathered from SLAC (via the proxy) and eventually they may run out memory on the Android.

Discussion

To a large extent it depends on how we plan to use this.

- If the phones are just MAs in a fixed location then simply porting pinger2.pl is easier and probably sufficient.
- If this is intended to grow into a mobile application for general use then it needs to be the Java implementation.

A next step is to get the data from the phone MA to the archive at SLAC. The current method ping_data.pl requires a public IP address for the phone which may not exist if its is mobile. Getting the MA to put the data to the archive may raise some security issue for the archiver.

Need your feedback on the idea of Measuring the Digital Development of the Countries using PingER data

Two days ago we started being unable to gather data from pinger.fsktm.um.edu.my (103.18.2.152). When one tries ping it fails,

```
ping pinger.fsktm.um.edu.my

ping: unknown host pinger.fsktm.um.edu.my

Exit 2
```

However pinging the IP address works:

```
117cottrell@rhel6-64i:~$ping 103.18.2.152 from http://202.28.194.4/toolkit/gui/reverse_traceroute.cgi?target=pinger.fsktm.um.edu.my&function=traceroute

PING 103.18.2.152 (103.18.2.152) 56(84) bytes of data.

64 bytes from 103.18.2.152: icmp_seq=1 ttl=48 time=265 ms

64 bytes from 103.18.2.152: icmp_seq=2 ttl=48 time=266 ms

64 bytes from 103.18.2.152: icmp_seq=3 ttl=48 time=265 ms

64 bytes from 103.18.2.152: icmp_seq=4 ttl=48 time=265 ms

^C

--- 103.18.2.152 ping statistics ---

4 packets transmitted, 4 received, 0% packet loss, time 3277ms
```

I thought it might be our DNS resolution, however I also cannot see it from Thailand, i.e. from

http://202.28.194.4/toolkit/gui/reverse_traceroute.cgi?target=pinger.fsktm.um.edu.my&function=traceroute

It gives

Can't find IPv4 address for host name pinger.fsktm.um.edu.my. Probably an unknown host.

I get the same result from a host in Pakistan http://comsatsswl.seecs.edu.pk:8080/cgi-bin/traceroute.pl?target=pinger.fsktm.um.edu.my&function=traceroute