Migration of Hadoop To Android Platform Using 'Chroot'

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Abstract—Google`s Map Reduce is one of the largest popular algorithms for big data processing. Moreover big data can be termed as large number of data to be process within short period of time. Its implementation - Hadoop reduces time requirement, provides reliability, scalability and protection from node failure which are handled within the system itself simply utilizing commodity hardware. This project is intended to optimize the current Hadoop implementation on low energy consuming android devices. Since new android devices are becoming powerful with its dual, quad or octa core processors with 1 to 2 GB ram becoming common practice in mobile devices. We also intend to utilize this mobile power for industrial purposes so that we can save cost on even commodity hardware.

Keywords— Mobile Hadoop, Hadoop on android, chroot, linux on android

I. INTRODUCTION

Big data is a big thing today. Analyzing and processing this big data to produce future predictions in order to support automated decision making system is a main task Hadoop can do with this application we intend to bring that productivity on android platform. With this application it becomes possible to carry the Big Data on android phones. The main need of this project is to process this Big Data on Android platform. Android Hadoop will provide a mobile Hadoop Environment with reduction in hardware cost. So it is energy efficient i.e. Quality of hardware remains same, hardware cost is reduced.

A. BasicConcepts

Increasing mobility power of different devices encourages to think about the processing power. This leads, to thinking of providing mobility to existing workforce environment. Hadoop is chosen to Optimized Map reduce Implementation on Android Platform mobility target for transferring desktop workforce into a mobile workforce. Problem definition defines to provide an application which will allow porting of Hadoop to android platform. Considering this, leads to solving following problems: Build an interface to install Linux. Build or use existing VNC app to interact with GUI. Install and configure hadoop for running pseudo-distributed mode. Run sample test program Hadoop we use for large data processing. Until recently we were stuck with PC to work on Hadoop. We have ported that capability to an android device. With the use of AndroHadoop we have provided a limited installation of Linux, just to support Hadoop installation. With its distributed processing, to understand this"Hadoop", we need an efficient system which can teach and train the working of hadoop to students and learners without investing in formation of large scale clusters. Small scale industries also cannot afford to have built large scale clusters. Today mobile and mobile based applications have become a part of our day to day life. With the revolution in mobile computing many great features and technologies were added to the field and mobiles got smaller, faster and better as the decade passed. It gave rise to the introduction of new mobile based operating systems where the programmers where presented with open source operating system named Android.

B. Maintaining the Integrity of the Specifications

1) Industrial requirement of Hadoop: If there is requirement for an organization to process a large amount of data on Hadoop with in a short period of time, the manager of the organization can suggest to their employee to use their android phones instead of buying new computer. Eg: Business Purpose.

2) Education Purpose: Learn Hadoop anyware, any time. AndroHadoop application will provide mobile hadoop environment with reduction in hardware cost. Instead of buying new system, install AndroHadoop application on smartphones.

3) Container: 'Cells' is compartment based virtual environment which empowers User to run an android operating system side by side with different virtual android working frameworks. Here android operating systems are may not be of same version. LXC is a Linux holder, which can be ported to Android. It has a library of container tools which can be ported to android. Which enables user to run an android operating system side by side with multiple virtual android operating frameworks. Here android working frameworks are may not be of same version. LXC is a Linux container, which can be ported to Android. It has a library of holder apparatuses which can be ported to android.

4) Abbreviations and Acronyms: CHROOT, VNC, GUI, HDFS.

C. VNC Viewer

It uses Virtual network computing technology. Virtual Network Computing (VNC) is a graphical desktop sharing system that utilizes the Remote Frame Buffer convention (RFB) to remotely control another computer. It transmits the keyboard and mouse occasions starting with one PC then onto the next, transferring the graphical screen updates back in the other direction, over a network. VNC is stage autonomous there are customers and servers for many GUI-based operating systems and for Java. Various customers might associate with a VNC server at the same time. Popular uses for this technology include remote specialized backing and getting to records on one work computer from one's home computer, or vice versa.

D. HDFS

HDFS cluster is a combination of a single Name Node which manages the cluster metadata and Data Node that stores the data. Files and directories are represented on the Name Node. The file contents are split into large blocks. Hadoop implements a Master/Slave architecture. The Hadoop Distributed File System (HDFS) is a distributed file system designed to keep running on product equipment. It has numerous similitudes with existing distributed file systems. However, the differences from other disseminated document frameworks are huge. HDFS is highly fault-tolerant and is designed to be deployed on minimal effort equipment. HDFS gives high throughput access to application data and is suitable for applications that have large data sets.
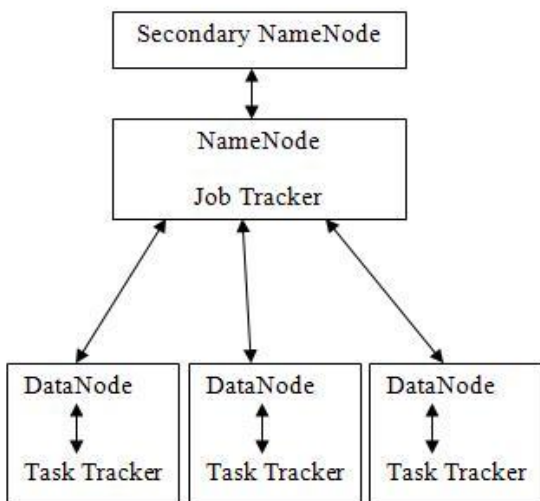

Fig. 1. Architecture of Hadoop Distributed File System (HDFS).

II. LINUX IN ANDROID - "CHROOT" STRATEGY

A. What is 'chroot'?

'Chroot' changes root environment. It mounts a specific. Registry as root and make a sub-process tree for specific system. Processes running under this environment, typically can`t access the registries outside the 'chroot'ed catalog. This behavior of the newly created root directory is known as 'chroot jail' [10]. We can see such implementation with DebianRunner [11] also.Following are the requirements needs to be fulfilled, in order to implement this method.

Requirements:

- Root Privileges.
- ARM supported Linux distribution
- Kernel modules loaded.
- Swap enabled and Looping enabled device
- Internet connection forwarding.
- High Speed Internet connection to download and install additional components.

By and large chroot is utilized as testing and improvement environment, to test dependency control, to test the capability of software for particular device, recover system etc.

B. Steps to actualize chroot

There are two approaches to execute on android device.

1) Manual: Using terminal emulator application and busybox from Google play store, and performing normal chroot on android. One can perform it on Linux by mounting the new Linux framework index or picture.

2) Automatic: Using an app called Linux deploy [12] from Google play store, which has arrangement setting for various variations of Linux and custom boot script support.

After installing perfect Linux for your device(x86/armv5/armv71), introduce VNCviewer app for remote login interface to same Linux. VNC viewer typically uses 5900port number.

C. Implementation

All present execution of Linux are accessible for different platforms. However Hadoops performance on various platform varies with processor architecture [13], [14]. Comparing with different architectures, and Hadoop`s basic need of commodity hardware, low power expending arm gadgets ought to be perfect for Hadoop.

D. Setting up environment

To install Hadoop in such 'chroot'-ed environment we have to perform the accompanying steps.

- Update Linux conveyance.
- Install java for your gadget design/abi.
- Download most recent Hadoop from apache storehouse.
- Navigate to home folder of user, then use 'vi .bashrc' to add following lines and add environmental variables.

III. APPLICATION

BYOD [8] approach usage presents cell phones in our daily industrial life. While we busy with our work these gadgets are not being utilized by any stretch of the imagination. Using that utilizing that computing power towards productivity is more

affordable for little sort commercial ventures. Little scale organizations wishing to run Hadoop jobs

Could benefit from this. Educational establishments could likewise actualize this procedure to concentrate on and understand the industrial implementation of Hadoop in practical and energy efficient way. One such application is also stated as to develop, debug and test MapReduce algorithms. Any little or huge industry singular/software engineer can create, debug and test his or her MapReduce program or job on android device.

CONCLUSION

AndroHadoop will provide a mobile Hadoop Environment with reduction in hardware cost. The system will be energy efficient. With the help of this system it becomes possible to work with Hadoop on Android platform. This applications helps to bring the productivity platform on android devices to access big data using MapReduce algorithm. We have successfully implemented Hadoop on android using 'chroot' method.

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REFERENCES

[1] Anderson M., (2014). Using Chroot to Bring Linux.Applications to Android, Embedded Linux Conference +.Android Builders Summit April 29th – May 1st 2014, The Linux Foundation.

[2] Kuester R., Developing on DragonBoard: Getting Started with APQ8060A and Pragmatux+Android, LinuxCon Europe 2012.

[3] Andrus, J., Dall, C., Hof, A. V. T., Laadan, O., & Nieh, J. (2011, October). Cells: a virtual mobile smartphone Architecture. In Proceedings of the Twenty-Third ACM Symposium on Operating Systems Principles (pp. 173-187). ACM.

[4] Bowker M. (2013). The VMware Mobile Secure;Workplace, Whitepaper, ESG Inc.

[5] Samsung, (2014). Meet evolving enterprise mobility Challenges with Samsung KNOX, White Paper, Samsung Inc.

[6] Dall, C., & Nieh, J. (2014, February). Kvm/arm: The Design and implementation of the linux arm hypervisor. In Proceedings of the 19th international conference on Architectural support for programming languages and Operating systems (pp. 333-348). ACM.

[7] Chawla, S., Nigam, A., Doke, P., & Kimbahune, S. (2011). A survey of virtualization on mobiles. In Advances in Computing and Communications (pp. 430-441). Springer Berlin Heidelberg.

[8] Jindal, A. K., & Naik, V. (2013). Protecting android Devices following BYOD policy against data security and Privacy attacks.

[9] Jaramillo, D., Furht, B., & Agarwal, A. (2014). Virtualization techniques for mobile systems. Springer International Pu.

[10] McFearin, L. D. (2011). Chroot Jail. In Encyclopedia of Cryptography and Security (pp. 206-207). Springer US.

[11] Gupta, A., Preston, K., & Rodriguez, A. (2010). DebianRunner: Running Desktop Applications on Android Smartphones.

[12] Skshidlevsky, A. A. (2013). The Software to Automate Processes of Installation and Launch of GNU/Linux Applications on Android Devices. Information & Control Systems/Informazionno-Upravlyaushie Sistemy, 66(5).

[13] Ferreira, T., Espinosa, A., Moure, J. C., & Hernández, P. (2013). An Optimization for MapReduce Frameworks in Multi-core Architectures. Procedia Computer Science, 18,2587-2590.

[14] Yan, F., Cherkasova, L., Zhang, Z., & Smirni, E. (2014, May). Heterogeneous cores for mapreduce processing: Opportunity or challenge?. In Network Operations and Management Symposium (NOMS), 2014 IEEE (pp. 1-4).