E-Commerce Big Data Analytics Using Hadoop

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Abstract

In the past few year's usage of internet by the people all over the world is increased enormously. Increase in the usage of internet there has been increase in online shopping that is e-commerce. It results the amount of information generated to increase exponentially. The main challenge in increasing data is how to identify and extract useful information from this massive amount of data and filtering the meaningful data for the decision makers. Due to heavy competitions in the marketplace, it is very sensitive to take better decisions to reach the goal. The impact of big data analytics in business intelligence allows overcoming these challenges. To enhance the business process in e-commerce the companies need to adapt business intelligence through Big Data Analytics. The impact of big data analytics plays a vital role in e-commerce for the competitive business environment. In this project we will analyze the ecommerce data sets which are available online and will find the insights of the data to improve the business and analyze the sales. Below are some insights that we get from our analysis

- Find the most regular customers - So that they can give some offers to such customers to improve the business more.

- Find the best-selling products by season wise - So that such particular products quantity will be increased according to the demand

- Find the products which are having lowest sale – So that they can provide some offers on that products to increase the sales.

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1. INTRODUCTION

E-commerce or electronic commerce is an exchange of purchasing or selling online. It draws on technologies, for example, mobile commerce, electronic finances transfer, production network management, and substantially more. The e-commerce field is increasing quickly over the world. The e-commerce business in India will be worth 38 billion dollars by 2016 and it is estimated to reach 159 billion dollars by 2020.

The e-commerce firms are becoming quickly everywhere throughout the world with a large number of exchanges made every day. Along these lines, one needs to analyze that information and draw some useful bits of knowledge from it.
Here, we convey to you a business use case of an e-commerce organization which needs to analyze their exchanges and draw some useful bits of knowledge out of it, which will be useful for their business development. The increase in online shopping increases the competition between different companies in e-commerce field. Due to advancement of technologies the current business development processes are outdated. To enhance the business process in e-commerce the companies need to adjust business intelligence through huge information examination. Big Data is a term which is continually evolving. It is a large measure of structured and unstructured information that can be mined for data. These informational collections are very large and complex that conventional information processing isn't capable to process them. Huge information is being used in numerous sectors. We will see the influence of Big Data Analytics in changing the E-Commerce business, so the business evaluated as these E-commerce can benefit the most users n associations from utilizing Big Data, because there will be data of the information collected on everyday bases. Numerous enormous retailers value this current information's data and helps them for predicting the user interests and provide their customers relative and interested searches when they shop on their site, with the goal that they draw in the customer by giving the required and relevant searches of the items or items. These preferences are altogether generated from Big Data examination. Enormous information comprises of two types of information one is structured and the other one is unstructured. The structured information deals with simple essential and regular information like name and address. Unstructured information deals with numerous information which is retrieved from places like web-based life and includes videos. This data assumes a fundamental role to e-commerce businesses, which can better serve the customer. E-Commerce businesses and retailers which operates online, to give a better service for this competitive and quick environment, pulls in the customers by online advertisements. As per the online approaches are part up with very specific investigation instruments for separate information and information's. Decisions will be optimized because of the huge volume of information obtained from multiple sources and in different configurations. These are the focal point of Big Data where it gives out superior, information driven yields. Usage of enormous information in ecommerce is given below

- By making use of real time analysis prices are changed in order to compete with other retailers.

- By analyzing the type of most products and least selling products we they can focus on the reason behind that and can take the decisions to improve their business.
- By analyzing the user ratings and reviews the business can be improved in such way that the user satisfied.
- The most vital role of big data is to provide a better experience for the customer when they make use of the website and also try to satisfy the user needs by giving the relevancy search.
- To predict the user interest and behaviors Predictive analytics is been used so that to provide the required products of user interest and satisfy his demands by giving proper online advertisements based on the predictive data.
- Big data is been used for personalization which in turn personalizes the users information such as mail id and address in order to increase the rate of conversation.

Big Data is a widely inclusive term for any gathering of data sets so vast and complex that it ends up hard to process utilizing available data the board apparatuses or conventional data preparing applications. The difficulties incorporate catch, term, stockpiling, look, sharing, exchange, investigation and perception. The pattern to bigger data sets is expected to the extra data logical from examination of a solitary huge arrangement of related data, when contrasted with isolated littler sets with a similar aggregate sum of data, enabling relationships to be found to "spot business patterns, counteract ailments, battle wrongdoing, etc.

Hadoop is a free, open-source Java-based system that underpins the preparing of substantial informational indexes in an appropriated figuring condition. It is a piece of the Apache venture supported by the Apache Software Foundation. Hadoop makes it conceivable to run applications on frameworks with a large number of hubs including a huge number of terabytes. Its circulated document framework encourages fast information exchange rates among hubs and enables the framework to keep working continuous if there should arise an occurrence of a hub disappointment. This methodology brings down the danger of cataclysmic framework disappointment, regardless of whether a critical number of hubs become out of commission. The Hadoop system is utilized by real players including Google, Yahoo and IBM, generally for applications including web crawlers and promoting. The favored working frameworks are any kind of Linux, windows (here we have to utilize Cygwin) yet Hadoop can likewise work with BSD and OS X.

MapReduce is for to preparing the information which s put away in HDFS. HDFS is Hadoop's execution of a disseminated document framework. It is intended to hold a lot of information and give access to this information to numerous customers dispersed over a system. MapReduce is a fantastic model for conveyed processing, presented by Google in 2004. Each MapReduce work is made out of a specific number of guide and lessen undertakings. The MapReduce model for serving various occupations comprises of a processor sharing line for the Map Tasks and a multi-server line for the Reduce Tasks. To run a MapReduce work, clients ought to outfit a guide work, a decrease work, input information, and a yield information area as appeared in figure 2. Whenever executed, Hadoop completes the accompanying advances: Hadoop breaks the info information into various information things by new lines and runs the guide work once for every datum thing, giving the thing as the contribution for the capacity. Whenever executed, the

guide work yields at least one key-esteem sets. Hadoop gathers all the key-esteem sets produced from the guide work, sorts them by the key, and gatherings together the qualities with a similar key. For each particular key, Hadoop runs the diminish work once while passing the key and rundown of qualities for that key as information. The lessen capacity may yield at least one key-esteem sets, and Hadoop thinks of them to a record as the last outcome. Hadoop enables the client to design the activity, submit it, control its execution, and question the state. Each activity comprises of autonomous assignments, and every one of the undertakings need a framework space to run.

Data processing with Hive

Hive is a Data Warehouse programming that encourages questioning and overseeing gigantic information living in conveyed stockpiling. Instead of composing enormous crude guide decrease programs in some programming language, Hive gives a SQL-like interface to information put away in Hadoop File System. Hive in light of its SQL like question language is regularly utilized as the interface to an Apache Hadoop based information warehouse. Hive is viewed as friendlier and progressively recognizable to clients who are accustomed to utilizing SQL for questioning information. Pig fits in through its information stream qualities where it assumes the errands of bringing information into Apache Hadoop and working with it to get it into the structure for questioning. A decent diagram of how this function is in Alan Gates posting on the Yahoo Developer blog titled Pig and Hive at Yahoo! from a specialized perspective both Pig and Hive are including finished so you can do undertakings in either instrument. Anyway, you will discover one apparatus or the other will be favored by the distinctive gatherings that need to utilize Apache Hadoop. The great part is they have a decision, and the two devices cooperate.

1.1 SCOPE

In this project, we take the shopping data with many attributes like the customer details, product details, customer address etc. The aim of this project is the analysis of the huge data like finding the top customers doing a greater number of sales and the products which are getting sale in more numbers and which are collecting highest amount and at what cities and states the sales are the highest and lowest etc. using the Hadoop through map reduce programs. We also used hive at the same time to write simple queries which in fact gives the desired result faster without having to write long programs and for visualization tableau is being used to show the reports.

1.2 EXISTING SYSTEM

The e-commerce firms are growing rapidly all over the world with millions of transactions made every day. There is a great challenge not only to store and manage such a large amount of data, but also to analyze and extract meaningful information from it and getting the benefit out of that analysis. There are several approaches to collecting, storing, processing, and analyzing big data. Present these analysis activities are happening using data warehousing technologies which are based on RDBMS. But it is more expensive and time consuming. To help better in this area, we are using the Hadoop and Hadoop Eco-systems.

1.3 PROPOSED SYSTEM

Our proposed system makes use of big data tools in ecommerce which allows firms to build better models, which produce results with higher precision. Big data enables you to hear the voice of every customer as against to customers at large. Many E-Commerce companies use this information to personalize their communications with their costumers, which in turns leads to meeting consumer expectations and satisfied customers. Here we will be showing a use case to find the insights of ecommerce data and get the benefits for business growth. Following are some insights that we find from the analysis

- State wise count of customer.

  From this, we can know which the states are have highest number of customers and which have lowest number of customers. If the customers count is very low, they can do, more promotions in such areas and they can grow their business.
- City wise number of orders.

  From this, we can know which cities have highest number of orders and lowest number of orders.
- Quarter wise sales.etc.

2. SYSTEM ANALYSIS

2.1. FUNCTIONAL REQUIREMENTS

Yield Design

A quality yield is one, which meets the necessities of the end client and presents the data plainly. In any framework aftereffects of handling are conveyed to the clients and to other framework through yields. In yield structure it is resolved how the data is to be uprooted for quick need and furthermore the printed copy yield. It is the most significant and direct source data to the client. Proficient and canny yield configuration improves the framework's relationship to help client basic leadership.

1. Structuring PC yield ought to continue in a composed, all around considered way; the correct yield must be created while guaranteeing that each yield component is planned with the goal that individuals will discover the framework can utilize effectively and viably. At the point when examination structure PC yield, they ought to Identify the particular yield that is expected to meet the prerequisites.

2. Select strategies for showing data.

3. Make record, report, or different configurations that contain data created by the framework.

- The yield type of a data framework ought to achieve at least one of the accompanying goals.

- Convey data about past exercises, current status or projections of the Future.

- Signal significant occasions, openings, issues, or alerts.
- Trigger an activity.
- Confirm an activity.

Yield Definition

The yields ought to be characterized as far as the accompanying focuses:

- Type of the yield.
- Content of the yield.
- Format of the yield.
- Location of the yield.
- Frequency of the yield.
- Volume of the yield.
- Sequence of the yield.

It isn't constantly attractive to print or show information as it is hung on a PC. It ought to be chosen as which type of the yield is the most appropriate.

For Example

- Will decimal focuses be embedded
- Should driving zeros be stifled.

Yield Media:

In the following stage it is to be chosen what medium is the most fitting for the yield. The fundamental contemplations when choosing about the yield media are:

- The appropriateness for the gadget to the specific application.
- The requirement for a printed copy.
- The reaction time required.
- The area of the clients

- The programming and equipment accessible.

Keeping in view the above portrayal the venture is to have yields mostly going under the class of interior yields. The principal yields wanted by the necessity determination are:

The yields were should have been produced as a hot duplicate and just as inquiries to be seen on the screen. Keeping in view these yields, the arrangement for the yield is taken from the yields, which are as of now being gotten after manual preparing. The standard printer is to be utilized as yield media for printed copies.

Information Design:

The information configuration is the connection between the data framework and the client. It contains the creating detail and strategies for information planning and those means are important to put exchange information into a usable structure for handling can be accomplished by investigating the PC to peruse information from a composed or printed record or it can happen by having individuals entering the information straightforwardly into the framework. The plan of information centers around controlling the measure of information required, controlling the mistakes, maintaining a strategic distance from postponement, evading additional means and keeping the procedure straightforward. The info is structured in such a way along these lines, that it furnishes security and usability with holding the protection. Information Design thought about the accompanying things:

- What information ought to be given as information?

- How the information ought to be orchestrated or coded?

- The discourse to direct the working faculty in giving info.

- Methods for getting ready information approvals and ventures to pursue when mistake happen.

Destinations

1. Info Design is the way toward changing over a client situated portrayal of the contribution to a PC based framework. This structure is essential to stay away from blunders in the information input procedure and demonstrate the right heading to the administration for getting right data from the modernized framework.

2. It is accomplished by making easy to understand screens for the information section to deal with expansive volume of information. The objective of structuring input is to make information section simpler and to be free from mistakes. The information passage screen is planned so that every one of the information controls can be performed. It additionally gives record seeing offices.

3. At the point when the information is entered it will check for its legitimacy. Information can be entered with the assistance of screens. Fitting messages are given as when required with the goal that the client won't be in maize of moment. In this way the goal of information configuration is to make an info design that is anything but difficult to pursues

Info Stages:

The fundamental information stages can be recorded as underneath:

- Data recording
- Data interpretation
- Data change
- Data confirmation
- Data control
- Data transmission
- Data approval
- Data remedy

Information Types:

- It is important to decide the different sorts of information sources. Information sources can be classified as pursues:

- External inputs, which are prime contributions for the framework.
- Internal inputs, which are client correspondences with the framework.
- Operational, which are PC office's correspondences to the framework?
- Interactive, which are inputs entered amid a discourse.

Information Media:

At this stage decision must be made about the info media. To close about the info media thought must be given to.

- Type of information
- Flexibility of arrangement

- Speed
- Accuracy
- Verification strategies
- Rejection rates
- Ease of amendment
- Storage and taking care of prerequisites
- Security
- Easy to utilize
- Portability

Keeping in view the above portrayal of the info types and information media, it tends to be said that the majority of the sources of info are of the type of inside and intelligent. As

Information is to be the straightforwardly entered in by the client, the console can be viewed as the most reasonable info gadget.

Error Avoidance

At this stage care is to be taken to guarantee that input information stays precise structure the phase at which it is recorded up to the phase in which the information is acknowledged by the framework. This can be accomplished just by methods for cautious control each time the information is dealt with.

Error Detection

Despite the fact that each exertion is made to evade the event of blunders, still a little extent of mistakes is in every case liable to happen, these kinds of blunders can be found by utilizing approvals to check the information.

Information Validation

Techniques are intended to distinguish blunders in information at a lower dimension of detail. Information approvals have been incorporated into the framework in pretty much every region where there is a probability for the client to submit blunders. The framework won't acknowledge invalid information. At whatever point an invalid information is entered in, the framework quickly prompts the client, and the client needs to again enter in the information and the framework will

acknowledge the information just if the information is right. Approvals have been incorporated where important.

The framework is intended to be an easy to use one. As it were the framework has been intended to discuss successfully with the client. The framework has been structured with spring up menus.

UI Design

It is fundamental to counsel the framework clients and talk about their requirements while structuring the UI:

UI frameworks can be extensively classified as:

1. Client started interface the client is in control, controlling the advancement of the client/PC discourse. In the PC started interface, the PC chooses the following stage in the collaboration.

2. PC started interfaces.

In the PC started interfaces the PC controls the advancement of the client/PC exchange. Data is shown and the client reaction of the PC makes a move or shows additional data.

User Initiated Interfaces

Client started interfaces fall into two rough classes:

1. Order driven interfaces: In this sort of interface the client inputs directions or inquiries which are translated by the PC.

2. Structures arranged interface: The client calls up a picture of the structure to his/her screen and fills in the structure. The structures arranged interface is picked in light of the fact that it is the best decision.

PC Initiated Interfaces

The accompanying PC – started interfaces were utilized:

1. The menu framework for the client is given a rundown of options and the client picks one; of options.

2. Questions – answer type discourse framework where the PC poses inquiry and takes dependent based on the clients answer.

Directly from the begin the framework will be menu driven, the opening menu shows the accessible alternatives. Picking one alternative gives another popup menu with more choices. Along these lines each choice leads the clients to information section structure where the client can enter in the information.

Blunder message structure:

The plan of mistake messages is a significant piece of the UI structure. As client will undoubtedly submit a few mistakes or other while planning a framework the framework ought to be intended to be useful by giving the client data in regard to the blunder, he/she has submitted.

This application must almost certainly produce yield at various modules for various sources of info.

2.2. PERFORMANCE REQUIREMENTS

Execution is estimated as far as the yield given by the application.

Prerequisite particular has a significant impact in the examination of a framework. Just when the necessity particulars are appropriately given, it is conceivable to structure a framework, which will fit into required condition. It rests to a great extent in the piece of the clients of the current framework to give the necessity determinations since they are the general population who at last utilize the framework. This is on the grounds that the prerequisites must be known amid the underlying stages with the goal that the framework can be structured by those necessities. It is extremely hard to change the framework once it has been structured and then again planning a framework, which does not take into account the necessities of the client, is of no utilization.

The necessity particular for any framework can be extensively expressed as given beneath:

- The framework ought to have the capacity to interface with the current framework
- The framework ought to be exact
- The framework ought to be superior to the current framework

The current framework is totally reliant on the client to play out every one of the obligations.

2.3. SOFTWARE REQUIREMENTS

Operating System	: Linux
Technology	: Hadoop
Tools	: Hive
Reporting Tool	: Tableau
Java Version	: JDK1.6 or Higher version

2.4. HARDWARE REQUIREMENTS

FOR EACH NODE/MACHINE IN A CLUSTER

Processor : Intel

Speed : 2.5 GHz

RAM : 8 GB or More

Hard Disk : 500 GB or More

3. SYSTEM DESIGN

3.1. ARCHITECTURE DESIGN

In the wake of breaking down every one of the necessities I have planned and going to actualize the fallowing engineering. As we find in the fallowing figure first we are going to stack the online business datasets into Hadoop HDFS and afterward that information we are going to process with some other huge information innovation called Hive and after that we will create the reports on that.

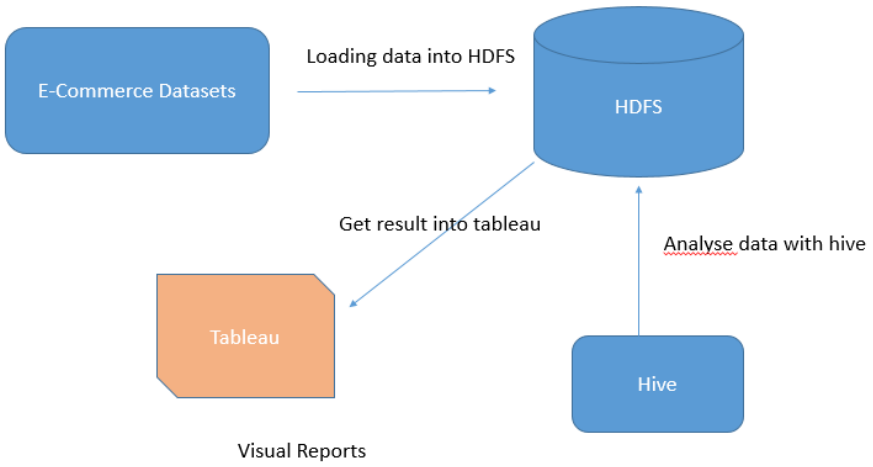


Fig.1: Proposed Architecture

3.2. MODULES

In our undertaking we have the fallowing modules

- Collecting the information and stacking into HDFS
- Analyzing the information
- Creating the reports

Module Description

Gathering the information and stacking into HDFS:

As an underlying advance of doing this task/Big information use case, we have to gather the online business information. There are bunches of web-based business datasets accessible on the web, in light of the fact that pretty much every web-based business application will have some standard arrangement of table's information like client's information, client address, items data, request subtleties, and so on. So we gathered the informational indexes at first and after that by utilizing shell scripting/directions we load the information into HDFS.

Dissecting the information: As the span of informational indexes being gathered and broke down in the online business knowledge is developing quickly, making conventional warehousing arrangements restrictively costly. Hadoop is a famous open-source map-lessen usage which is being utilized as a choice to store and process incredibly expansive informational collections on product equipment. Be that as it may, the guide lessen programming model is exceptionally low dimension and expects engineers to compose custom projects which are difficult to keep up and reuse. In this venture, we are utilizing Hive, an open-source information warehousing arrangement based over Hadoop as appeared in Fig.1. Hive underpins inquiries communicated in a SQL-like revelatory language - HiveQL, which are accumulated into guide decrease employments executed on Hadoop. Furthermore, HiveQL bolsters custom guide diminish contents to be connected to questions.

Producing the Reports:

Information is futile if everything it does is sitting in the information distribution center. Subsequently, the introduction layer is of high significance. The vast majority of the OLAP sellers as of now have a front-end introduction layer that enables clients to call up pre-characterized reports or make specially appointed reports. Revealing devices are generally used to make such reports to help basic leadership and measure execution. Organizations use them for money related solidification, for assessment of procedures and approaches and frequently only for plain announcing. In our task we are going to utilize scene as the revealing apparatus which will create the reports in the required configuration (i.e., diagrams, outlines etc...).

3.3. UML DIAGRAMS

UML Diagrams for our application are as follows:

3.3.1. ACTIVITY DIAGRAM

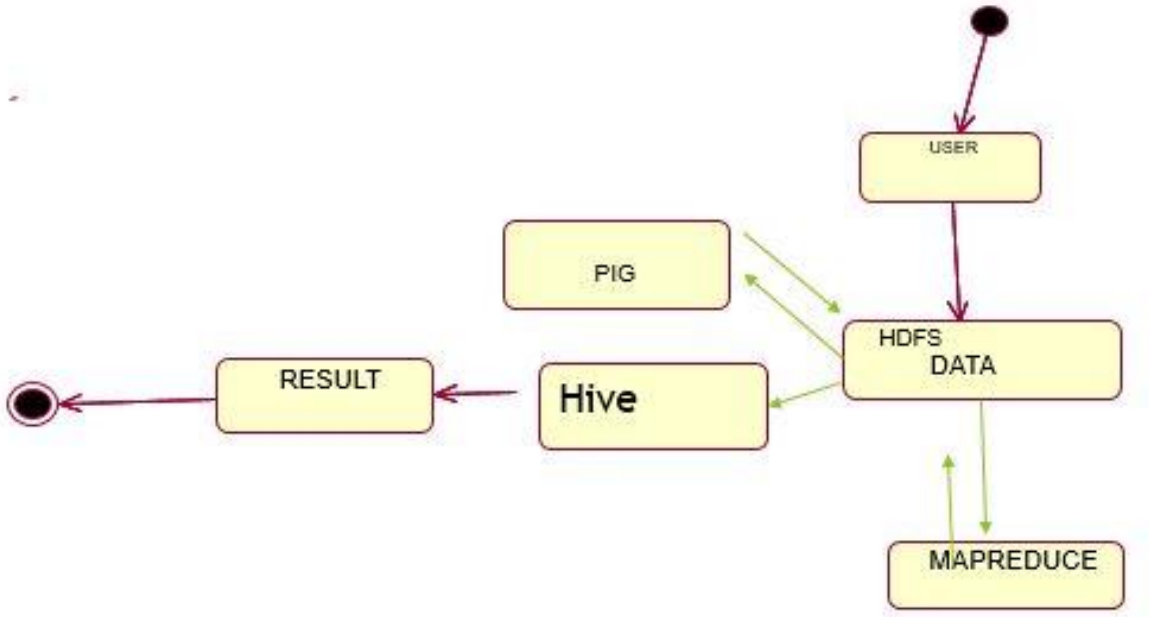


Fig. 2 Activity diagram

The activity diagram depicts the main basic structure of the project which tells how the Hadoop and hive and map reduce are linked to produce the desired analysis. As shown in the diagram, the data is loaded into the HDFS through the user. And then this data is used by the MapReduce programs using driver, mapper and reducer classes and the hive tool is also used to analyze data in a simpler way and its result is visualized in tableau in the form of graphs.

3.3.2. USE CASE DIAGRAM

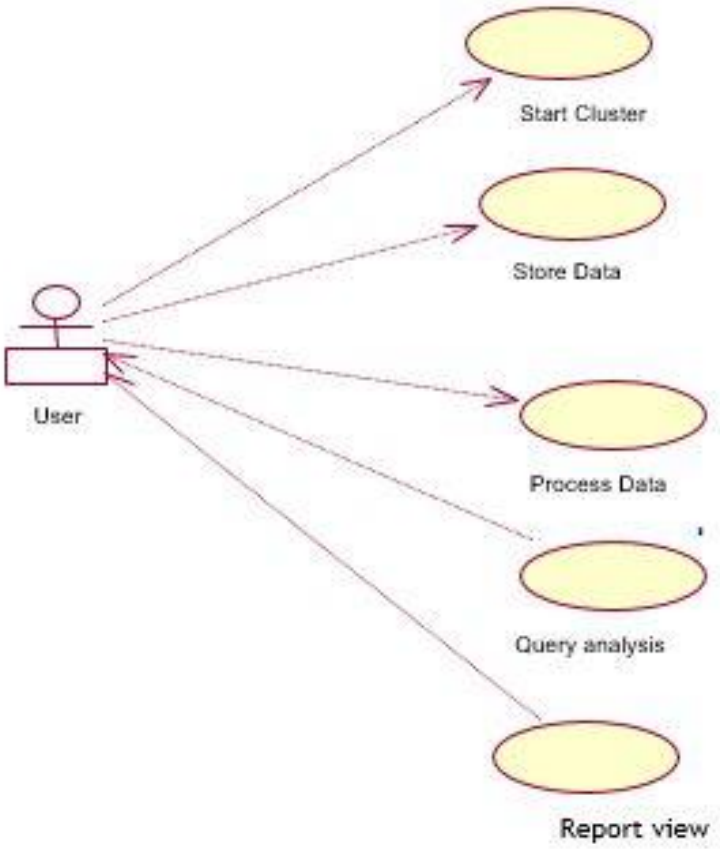


Fig. 3. Use case diagram

The use case diagram depicts that the user can start the cluster by forming it and store the data which can be very huge and can process it by using query analysis in hive analyzing various useful data which can be used further to improve the business using various queries and can view the reports produced as the result of the queries.

3.3.3. SEQUENCE DIAGRAM

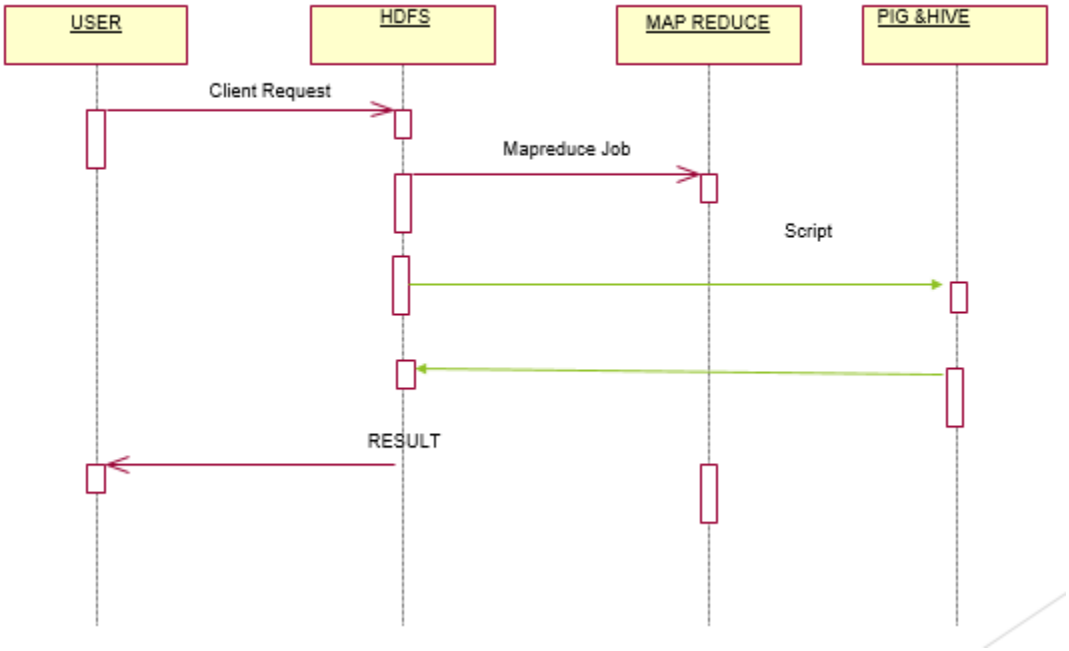


Fig. 4. Sequence diagram

The sequence diagram depicts that the user and the HDFS interact with each other when sending the client request from user to HDFS and at last when sending the result back from HDFS to user and the as HDFS stores data, it data is used by the MapReduce to analyze the data and also in the same way by the hive or pig tool in the form of MapReduce job and script respectively.

4. SYSTEM IMPLEMENTATION

Technologies USED:

Coming up next are the advances which we are going to use in our genuine usage of our venture

1. Apache Hadoop
2. Apache Hive
3. Tableau

Technologies Description:

What is Hadoop?

The Apache Hadoop programming library is a structure that takes into consideration the conveyed handling of substantial informational indexes crosswise over bunches of PCs utilizing basic

programming models. It is intended to scale up from single servers to a huge number of machines, each offering neighborhood calculation and capacity. As opposed to depend on equipment to convey high accessibility, the library itself is intended to recognize and deal with disappointments at the application layer, so conveying a very accessible administration over a group of PCs, every one of which might be inclined to disappointments. The center parts of Hadoop are

- HDFS (Hadoop Distributed File System)
- MapReduce Programming Model

HDFS (Hadoop Distributed File System):

The Hadoop Distributed File System (HDFS) is a dispersed record framework intended to keep running on item equipment. It has numerous similitudes with existing dispersed document frameworks. In any case, the distinctions from other dispersed document frameworks are huge. HDFS is very issue tolerant and is intended to be sent on ease equipment. HDFS gives high throughput access to application information and is reasonable for applications that have substantial informational collections. HDFS loosens up a couple POSIX prerequisites to empower gushing access to record framework information. HDFS was initially worked as framework for the Apache Nutch web internet searcher venture. HDFS is a piece of the Apache Hadoop Core venture

HDFS suppositions and objectives:

HDFS is an appropriated document framework intended to deal with expansive informational indexes and keep running on ware equipment. HDFS is profoundly issue tolerant and is intended to be conveyed on minimal effort equipment. HDFS gives high throughput access to application information and is appropriate for applications that have substantial informational collections. HDFS loosens up a couple POSIX prerequisites to empower spilling access to record framework information. HDFS was initially worked as framework for the Apache Nutch web internet searcher venture.

Equipment Failure

One result of scale is that equipment disappointment is the standard instead of the exemption. A HDFS example may comprise of hundreds or thousands of server machines, each putting away piece of the record framework's information. The way that there are countless and that every segment has a non-paltry likelihood of disappointment implies that some part of HDFS is quite often carrying on gravely. Indeed, even with RAID gadgets, disappointments will happen much of the time. In this way, location of issues and snappy, programmed recuperation from them is a center building objective of HDFS.

Spilling Data Access

Applications that keep running on HDFS need spilling access to their informational collections. They are not standard applications that commonly keep running on universally useful document frameworks. HDFS is structured more for cluster handling instead of intuitive use by clients. The

accentuation is on high throughput of information get to instead of low idleness of information get to. POSIX forces numerous hard necessities that are not required for applications that are focused for HDFS. POSIX semantics in a couple of key territories have been loose to pick up an expansion in information throughput rates.

Extensive Data Sets

Applications that keep running on HDFS have extensive informational collections. A run of the mill document in HDFS is gigabytes to terabytes in size. In this manner, HDFS is tuned to help substantial records. It ought to give high total information data transmission and scale to several hubs in a solitary bunch. It should bolster countless records in a solitary occasion.

Basic Coherency Model

HDFS applications need a compose once-read-many access model for records. A document once made, composed, and shut need not be changed aside from adds. This supposition improves information coherency issues and empowers high throughput information get to. A MapReduce application or a web crawler application fits impeccably with this model.

HDFS Architecture Design

The figure underneath gives a run-time perspective on the design indicating three kinds of location spaces: the application, the Name Node and the Data Node. A basic bit of HDFS is that there are various occasions of Data Node.

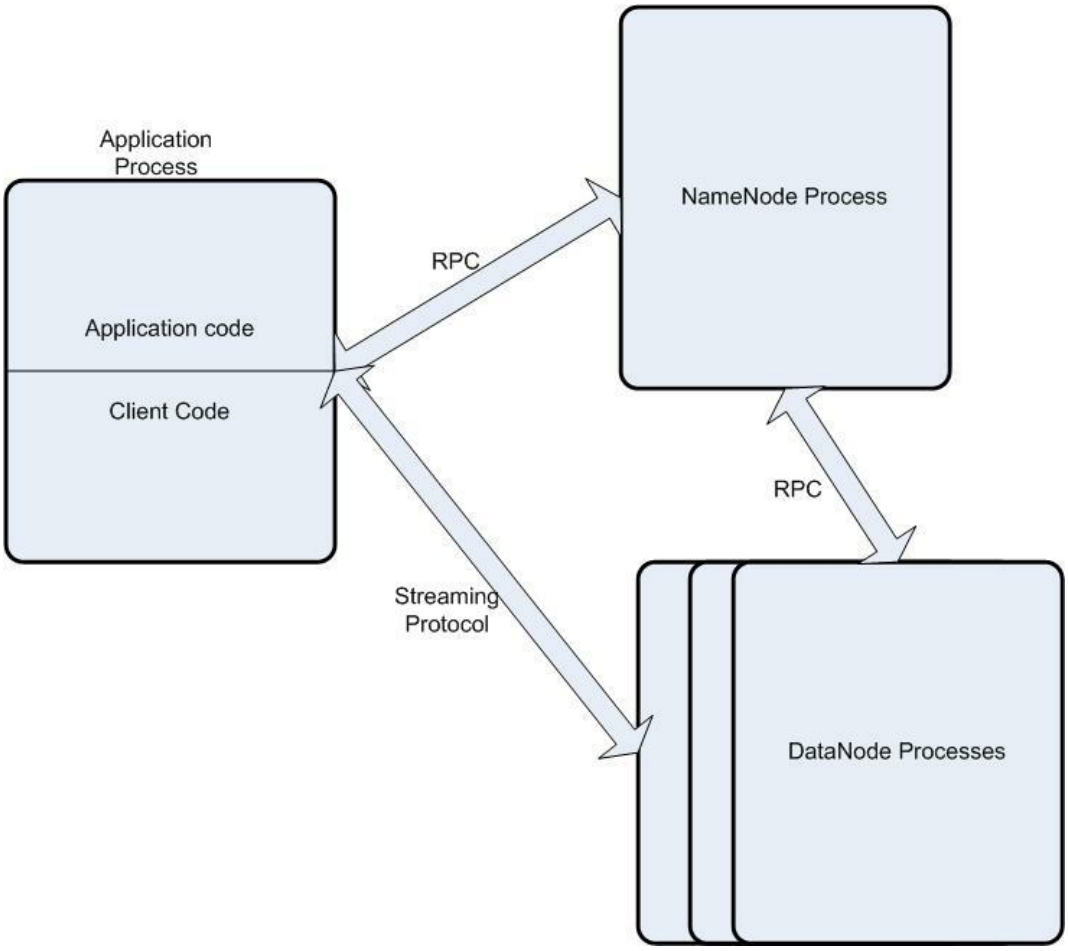


Fig.5. .HDFS Design Architecture

The application fuses the HDFS customer library into its location space. The customer library deals with all correspondence from the application to the Name Node and the Data Node. A HDFS bunch comprises of a solitary Name Node—an ace server that deals with the document framework namespace and controls access to records by customers. What's more, there are various Data Nodes, typically one for each PC hub in the bunch, which oversee capacity joined to the hubs that they keep running on.

The Name Node and Data Node are bits of programming intended to keep running on product machines. These machines regularly run a GNU/Linux working framework (OS). HDFS is fabricated utilizing the Java language; any machine that bolsters Java can run the Name Node or the Data Node programming. Use of the Java language implies that HDFS can be sent on a wide scope of machines. A run of the mill sending has a committed machine that runs just the Name Node programming. Every one of different machines in the bunch runs one example of the Data Node programming. The design does not block running various Data Nodes on a similar machine yet in a genuine arrangement that is once in a while the case.

HDFS Files

There is a qualification between a HDFS document and a local (Linux) record on the host PC. A PC in a HDFS establishment is (commonly) designated to one Name Node or one Data Node. Every PC has its own record framework and data around a HDFS document—the metadata—is overseen by the Name Node and industrious data is put away in the Name Node's host record framework. The data contained in a HDFS document is overseen by a Data Node and put away on the Data Node's host PC record framework.

HDFS uncovered a record framework namespace and enables client information to be put away in HDFS documents. A HDFS record comprises of various squares. Each square is ordinarily 64MByes. Each square is reproduced some predetermined number of times. The imitations of the squares are put away on various Data Nodes picked to think about stacking a Data Node just as to give both speed in move and flexibility if there should be an occurrence of disappointment of a rack. See Block Allocation for a portrayal of the distribution calculation.

A standard catalog structure is utilized in HDFS. That is, HDFS records exist in registries that may thusly be sub-indexes of different catalogs, etc. There is no understanding of a present catalog inside HDFS. HDFS documents are alluded to by their completely qualified name which is a parameter of a significant number of the components of the association between the Client and different components of the HDFS design.

The Name Node executes HDFS record framework namespace activities like opening, shutting, and renaming documents and indexes. It additionally decides the mapping of squares to Data Nodes. The rundown of HDFS documents having a place with each square, the present area of the square imitations on the Data Nodes, the condition of the record, and the entrance control data is the metadata for the group and is overseen by the Name Node.

The Data Nodes are in charge of serving perused and compose demands from the HDFS document framework's customers. The Data Nodes likewise perform square copy creation, cancellation, and replication upon guidance from the Name Node. The Data Nodes are the judge of the condition of the repeats and they report this to the Name Node.

The presence of a solitary Name Node in a bunch extraordinarily rearranges the engineering of the framework. The Name Node is the referee and storehouse for all HDFS metadata. The customer sends information legitimately to and peruses straightforwardly from Data Nodes with the goal that customer information never courses through the Name Node.

Square Allocation

Each square is imitated some number of times—the default replication factor for HDFS is three. Whenever addBlock() is conjured, space is dispensed for every copy. Every imitation is allotted on an alternate Data Node. The calculation for playing out this designation endeavors to adjust execution and unwavering quality. This is finished by thinking about the accompanying components:

- The dynamic burden on the arrangement of Data Nodes. Inclination is given to all the more daintily stacked Data Nodes.

- The area of the Data Nodes. Correspondence between two hubs in various racks needs to experience switches. As a rule, arrange data transfer capacity between machines in a similar rack is more prominent than system transmission capacity between machines in various racks.

- For the basic case, when the replication factor is three, HDFS's position arrangement is to put one imitation on one hub in the nearby rack, another on a hub in an alternate (remote) rack, and the keep going on an alternate hub in a similar remote rack. This arrangement cuts the between rack compose traffic which for the most part improves compose execution. The possibility of rack disappointment is far not as much as that of a hub disappointment; accordingly this co-area strategy does not unfavorably affect information unwavering quality and accessibility ensures. In any case, it reduces the total system transmission capacity utilized when perusing information since a square is set in just two novel racks as opposed to three. With this strategy, the copies of a record don't equally convey over the racks. 33% of reproductions are on one hub on some rack; the other 66% of copies are on particular hubs one an alternate rack. This arrangement improves compose execution without trading off information unwavering quality or read execution.

The figure beneath shows how squares are reproduced on various Data Nodes.

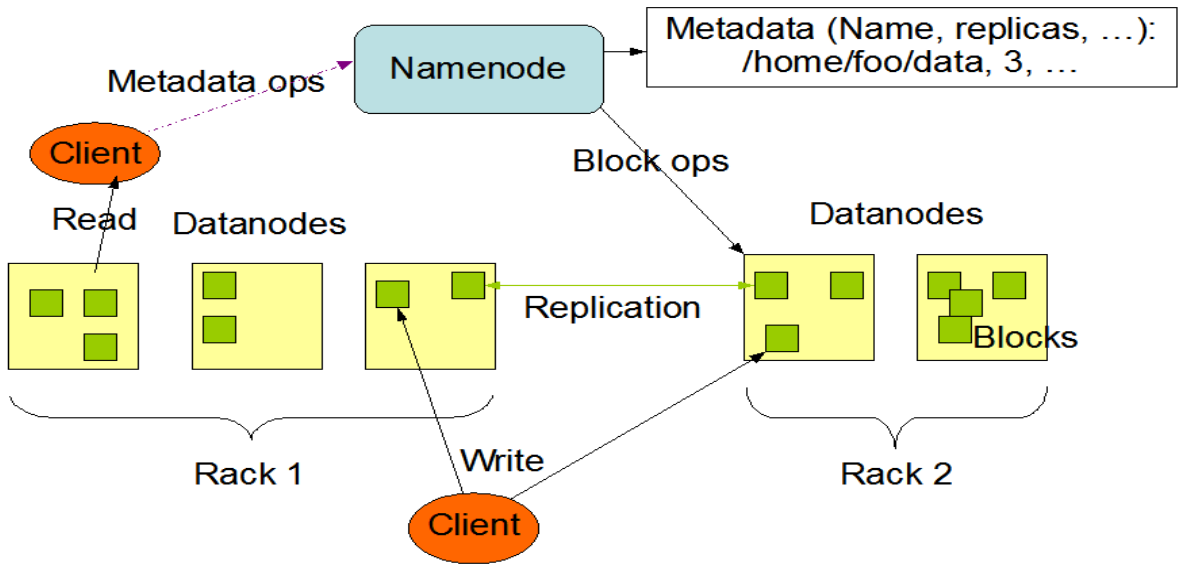


Fig.6..Blocks Replication in Data Nodes

Squares are connected to the document through INode. Each square is given a timestamp that is utilized to decide if an imitation is current.

MapReduce

Hadoop MapReduce is a product structure for effectively composing applications which process huge measures of information (multi-terabyte informational collections) in-parallel on expansive bunches (a large number of hubs) of item equipment in a solid, flaw tolerant way.

A MapReduce work for the most part parts the information informational collection into autonomous pieces which are handled by the guide undertakings in a totally parallel way. The system sorts the yields of the maps, which are then contribution to the decrease errands. Normally both the info and the yield of the activity are put away in a record framework. The structure deals with booking undertakings, checking them and re-executes the fizzled assignments.

Normally the register hubs and the capacity hubs are the equivalent, that is, the mapreduce structure and the Hadoop Distributed File System (see HDFS Architecture Guide) are running on a similar arrangement of hubs. This setup enables the structure to successfully plan errands on the hubs where information is now present, bringing about high total data transfer capacity over the group.

The MapReduce system comprises of a solitary ace JobTracker and one slave TaskTracker per bunch hub. The ace is in charge of planning the occupations' segment undertakings on the slaves, checking them and re-executing the fizzled errands. The slaves execute the errands as coordinated by the ace.

Negligibly, applications determine the info/yield areas and supply map and lessen capacities by means of usage of proper interfaces as well as unique classes. These, and other occupation parameters, involve the activity setup. The Hadoop work customer at that point presents the activity (container/executable and so on.) and setup to the JobTracker which at that point accepts the accountability of circulating the product/design to the slaves, booking assignments and observing them, giving status and indicative data to the activity customer.

Sources of info and Outputs

The MapReduce system works solely on <key, value> sets, that is, the structure sees the contribution to the activity as a lot of <key, value> matches and delivers a lot of <key, value> combines as the yield of the activity, possibly of various sorts.

The key and esteem classes must be serializable by the structure and thus need to actualize the Writable interface. Also, the key classes need to actualize the WritableComparable interface to encourage arranging by the system.

Info and Output kinds of a MapReduce work:

(input) <k1, v1> - > map - > <k2, v2> - > join - > <k2, v2> - > decrease - > <k3, v3> (yield)

Hadoop Features

Versatile

Hadoop is an exceptionally adaptable capacity stage, since it can store and disseminate extremely expansive informational collections crosswise over many economical servers that work in parallel. In contrast to customary social database frameworks (RDBMS) that can't scale to process a lot of

information, Hadoop empowers organizations to run applications on a large number of hubs including a great many terabytes of information.

Financially savvy

Hadoop likewise offers a financially savvy stockpiling answer for organizations' detonating informational collections. The issue with customary social database the executives frameworks is that it is incredibly cost restrictive to scale to such an extent so as to process such monstrous volumes of information. With an end goal to lessen costs, numerous organizations in the past would have needed to down-example information and group it dependent on specific suppositions about which information was the most profitable. The crude information would be erased, as it would be too cost-restrictive to keep. While this methodology may have worked for the time being, this implied when business needs changed, the total crude informational index was not accessible, as it was too costly to even think about storing. Hadoop, then again, is planned as a scale-out design that can moderately store the majority of an organization's information for later use. The cost investment funds are stunning: rather than costing thousands to a huge number of pounds per terabyte, Hadoop offers figuring and capacity abilities for many pounds per terabyte.

Adaptable

Hadoop empowers organizations to effectively get to new information sources and tap into various kinds of information (both organized and unstructured) to create an incentive from that information. This implies organizations can utilize Hadoop to get profitable business bits of knowledge from information sources, for example, web based life, email discussions or clickstream information. What's more, Hadoop can be utilized for a wide assortment of purposes, for example, log handling, proposal frameworks, information warehousing, advertise battle investigation and misrepresentation discovery.

Quick

Hadoop's interesting capacity strategy depends on a conveyed record framework that fundamentally 'maps' information wherever it is situated on a bunch. The instruments for information handling are frequently on similar servers where the information is found, bringing about a lot quicker information preparing. In case you're managing extensive volumes of unstructured information, Hadoop can productively process terabytes of information in not more than minutes, and petabytes in hours.

Versatile to disappointment

A key favorable position of utilizing Hadoop is its adaptation to non-critical failure. At the point when information is sent to an individual hub, that information is additionally repeated to different hubs in the group, which implies that in case of disappointment, there is another duplicate accessible for use. Our design gives security from both single and different disappointments. With regards to taking care of substantial informational collections in a safe and financially savvy way, Hadoop has the preferred standpoint over social database the board frameworks, and its incentive for any size business will keep on expanding as unstructured information keeps on developing.

Apache Hive

Hive is an information distribution center that utilizes MapReduce to break down information put away on HDFS. Specifically, it gives a question language called HiveQL that intently takes after the regular Structured Query Language (SQL) standard.

Why Hive ?

As a matter of fact we are creating MapReduce Programs, we have Hadoop Streaming and clarified that one vast advantage of Streaming is the means by which it permits quicker pivot in the advancement of MapReduce occupations. Hive makes this a stride further. Rather than giving without end of all the more rapidly creating guide and decrease assignments, it offers a question language dependent on the business standard SQL. Hive takes these HiveQL articulations and promptly and consequently makes an interpretation of the questions into at least one MapReduce employments. It at that point executes the general MapReduce program and returns the outcomes to the client. While Hadoop Streaming diminishes the required code/incorporate/submit cycle, Hive evacuates it and rather just requires the arrangement of HiveQL explanations. This interface to Hadoop not just quickens the time required to create results from information examination, it fundamentally widens who can utilize Hadoop and MapReduce. Rather than requiring programming improvement abilities, anybody with a nature with SQL can utilize Hive. The mix of these properties is that Hive is frequently utilized as an apparatus for business and information experts to perform impromptu inquiries on the information put away on HDFS. Direct utilization of MapReduce requires map and lessen undertakings to be composed before the activity can be executed which implies an important postponement from the possibility of a conceivable inquiry to its execution. With Hive, the information examiner can take a shot at refining HiveQL inquiries without the continuous inclusion of a product designer. There are obviously operational and down to earth confinements (a seriously composed question will be wasteful paying little heed to innovation) yet the wide guideline is convincing.

Hive Internal Working:

Hive interior plan incorporates the fallowing

UI - The UI for clients to submit inquiries and different tasks to the framework. As of now the framework has a direction line interface and an electronic GUI is being created.

Driver - The segment which gets the inquiries. This segment actualizes the thought of session handles and gives execute and get APIs demonstrated on JDBC/ODBC interfaces.

Compiler - The segment that parses the inquiry, does semantic investigation on the distinctive question squares and inquiry articulations and in the long run produces an execution plan with the assistance of the table and segment metadata gazed upward from the metastore.

Metastore - The segment that stores all the structure data of the different tables and segments in the stockroom including section and segment type data, the serializers and deserializers important

to peruse and compose information and the comparing hdfs records where the information is put away.

Execution Engine - The segment which executes the execution plan made by the compiler. The arrangement is a DAG of stages. The execution motor deals with the conditions between these distinctive phases of the arrangement and executes these phases on the fitting framework segments.

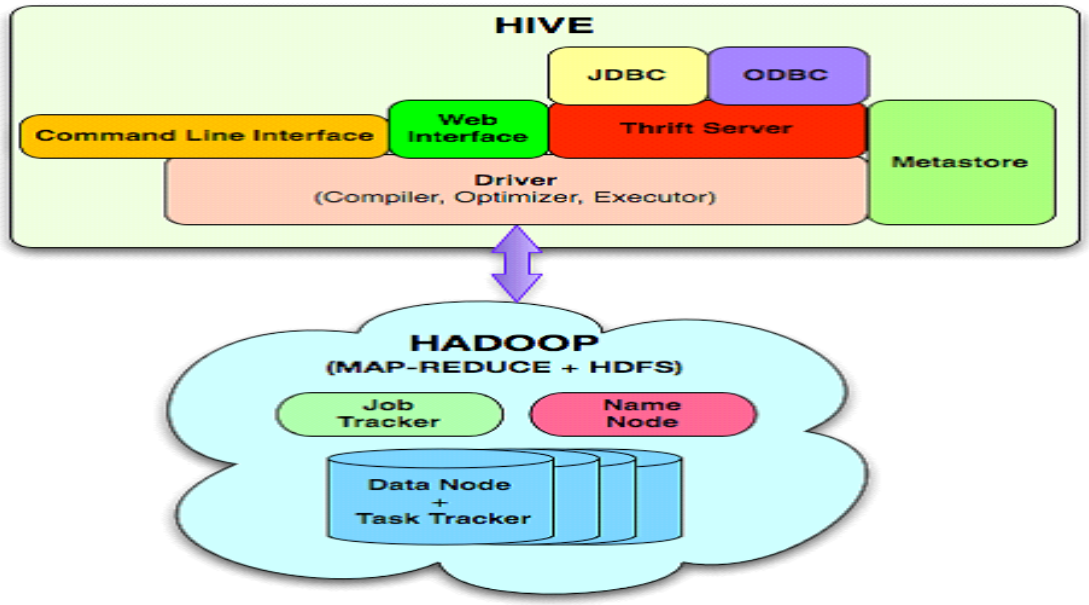


Fig.7..Hive Architecture

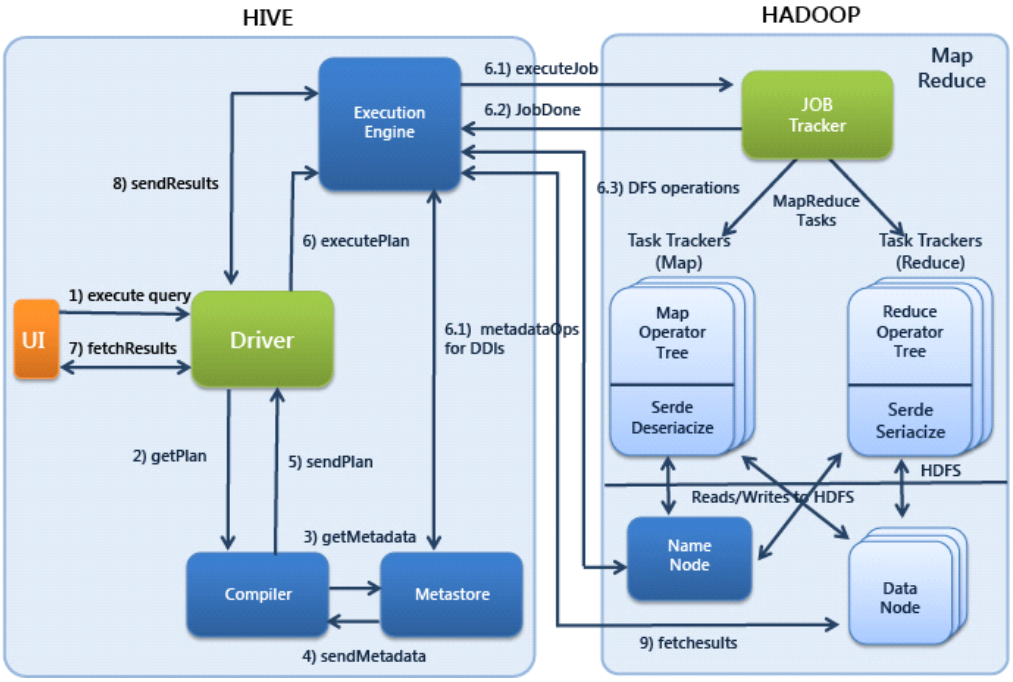


Fig: 8. Hive Job execution flow

Stage 1: The UI calls the execute interface to the Driver.

Stage 2: The Driver makes a session handle for the question and sends the inquiry to the compiler to create an execution plan.

Stage 3: The compiler gets the fundamental metadata from the metastore. This metadata is utilized to type check the articulations in the question tree just as to prune parcels dependent on inquiry predicates.

Stage 5: The arrangement produced by the compiler is a DAG (Direct non-cyclic chart) of stages with each stage being either a guide/decrease work, a metadata activity or a tasks on hdfs. For guide/diminish stages, the arrangement contains map administrator trees (administrator trees that are executed on the mappers) and a decrease administrator tree (for activities that need reducers).

Stage 6: The execution motors presents these phases to suitable segments (stages 6, 6.1, 6.2 and 6.3 strides in above figure). In each errand (mapper/reducer) the deserializer related with the table or middle of the road yields is utilized to peruse the columns from hdfs records and these are gone through the related administrator tree. When the yield is produced, it is kept in touch with a transitory hdfs document however the serializer (this occurs in the mapper in the event that the activity does not require a decrease. The brief records are utilized to give information to consequent guide/decrease phases of the arrangement. For DML activities the last brief document is moved to the table's area. This plan is utilized to guarantee that grimy information isn't perused (record rename being a nuclear activity in hdfs). For questions, the substance of the brief record are perused by the execution motor legitimately from hdfs as a major aspect of the get call from the Driver (stages 7, 8 and 9).

Scene

In the present focused world associations are expecting an answer that can fulfill their data needs in only a single tick; settle business questions in a moment or two; with choice to redo according to hierarchical necessities. What Information Technology offers is a scope of Business Intelligence Tools that help associations in taking business choices all the more successfully and effectively.

Out of 100s of Business Intelligence Tools accessible in the market, I encountered scene and trust me it's simply magnificent. This BI Tool accompanies numerous rich highlights. You essentially need to move things and you will get what you really need, that too in simply part of seconds.

Scene offers four business insight items viz.

- Tableau Desktop
- Tableau Server
- Tableau Digital
- Tableau Public

Key differentiators

Fig.9. Key Features of Tableau

Instrument for everybody

Regularly, it has come to see that, there exists a hole between the report engineer and business chief, for example the person who devours the report. Scene connects this hole, as it were, by offering report building capacity which a layman can use to build up a Business Intelligence Solution. This aides in limiting the reliance on IT assets. The essential and a standout amongst the best highlights of Tableau is you need not be a specialized master. Business clients like chiefs, office heads, deals and promoting heads, deals agents, senior administration can without much of a stretch and viably use Tableau to create and produce reports to fulfill their data need while taking business choices.

Quick

Scene is one of the quickest Business Intelligence Tool accessible in the market. Scene can make reports in minutes which may take hours in Microsoft Excel. One can interface with information source and in couple of moment's time one can have alluring graphical representations to look over.

Maps

Scene's in-manufactured geocoding highlight makes Map a center piece of Tableau. At whatever point clients have information identified with regular regions like nations, states or post codes, they need not enter scope or longitude information to find that territory on the guide. Alongside solid information representation, scene gives us adaptability to recount stories with maps and to utilize maps to bore down into related data.

Interactive Data Visualization

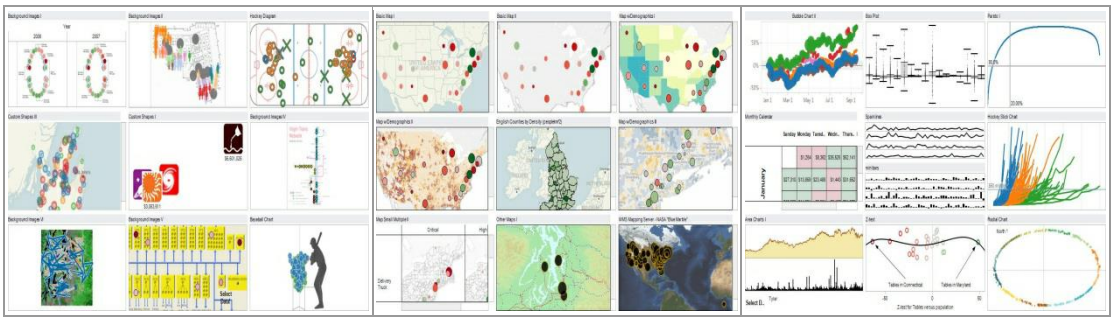


Fig.10. .Data Visualization Formats

Tableau is one of the intuitive Business Intelligence Reporting Tools accessible in the market. Scene comprehends the kind of information associated and recommends reasonable representation. Highlights like "Show Me" prescribes the appropriate information perception dependent on the chose information.

When it is associated with a database, Tableau consequently fragments information into measurements and measures.

Scene offers huge number of information representations by perusing the information which helps in finding huge business discoveries. Scene likewise offers boring through the information, subsequently influencing it conceivable to reach to the least and most natty gritty data conceivable. Adaptability

Scene gives adaptability to pick how you work with information. One can legitimately interface with database or can use in memory innovation. In memory can be utilized when database is moderate or one needs to work disconnected or when live database association is beyond the realm of imagination.

Scene has a capacity to associate straightforwardly with practically a wide range of databases accessible in the business. This fundamentally helps in decreasing time and endeavors for totaling the information and bringing into nearby information stockroom. Having direct network with different information sources, additional time can be spent in examination. Scene additionally comprehends and expands all the local capacities accessible in the associated database.

Prudent

Scene is a standout amongst the most efficient Business Intelligence Tools accessible in the market. Associations can likewise set aside extra cash as there is less reliance on extra IT assets.

Sharing of data

Scene Server offers disconnected and internet distributing of the information representation which makes the data trade quick, basic and viable. Scene Server shares data alongside fundamental outline information through messages alongside different information trades groups.

Looks after Security

Scene regards security conventions. Each client has an exceptional id and secret key that limits the entrance to business data.

IMPLENTATION

The main period of our task is introducing hadoop bunch. The best possible methodology would be a 2 stage methodology. Initial step is introduce single-hub Hadoop machines, arrange and test them as nearby Hadoop frameworks. Second step is combine that solitary hub frameworks into a multi-hub group. So first given us a chance to perceive how to setup the single hub machine.

SINGLE NODE SETUP

Hadoop is bolstered by GNU/Linux stage and its flavors. In this manner, we need to introduce a Linux working framework for setting up Hadoop condition. On the off chance that you have an OS other than Linux, you can introduce a Virtual box programming in it and have Linux inside the Virtual box. So first we introduced VM and did the setup of Ubuntu OS.

Pre-installation Setup

Before installing Hadoop into the Linux environment, we need to set up Linux using **ssh** (Secure Shell). Follow the steps given below for setting up the Linux environment.

Creating a User

At the beginning, it is recommended to create a separate user for Hadoop to isolate Hadoop file system from UNIX file system. Follow the steps given below to create a user −

- Open the root using the command “su”.
- Create a user from the root account using the command “useradd username”.
- Now you can open an existing user account using the command “su username”.

Open the Linux terminal and type the following commands to create a user.

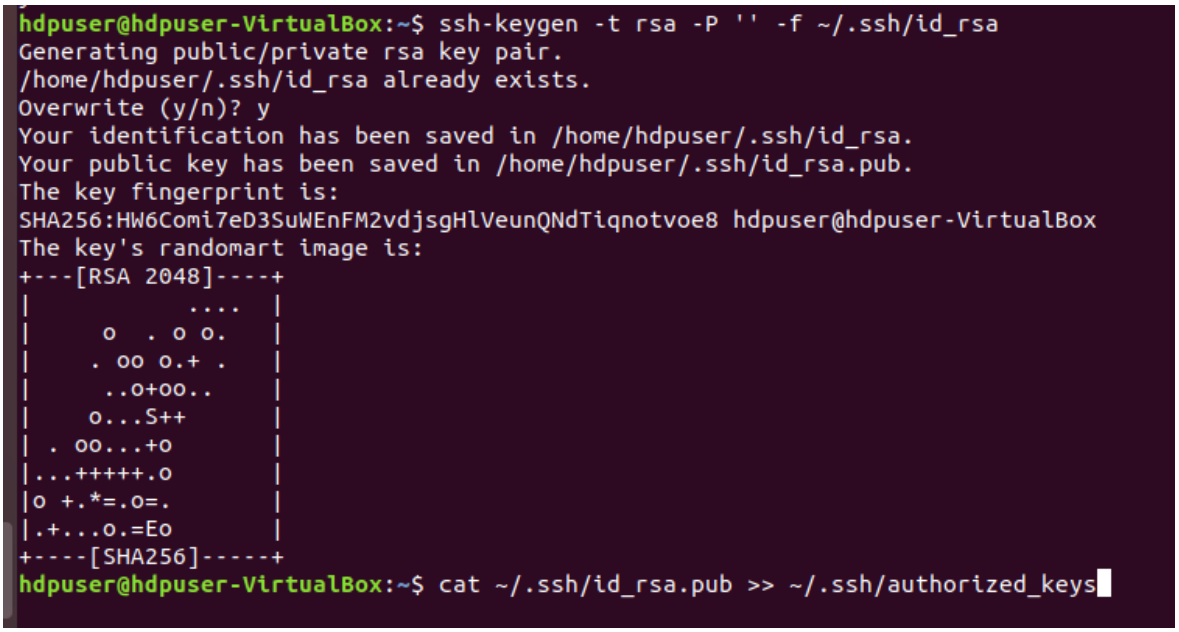
```
$ su
   password:
# useradd hadoop
# passwd hadoop
   New passwd:
   Retype new passwd
```

SSH Setup and Key Generation

SSH setup is required to do different operations on a cluster such as starting, stopping, distributed daemon shell operations. To authenticate different users of Hadoop, it is required to provide public/private key pair for a Hadoop user and share it with different users.

The following commands are used for generating a key value pair using SSH. Copy the public keys form id_rsa.pub to authorized_keys, and provide the owner with read and write permissions to authorized_keys file respectively.

```
$ ssh-keygen -t rsa -P '' -f ~/.ssh/id_rsa
$ cat ~/.ssh/id_rsa.pub >> ~/.ssh/authorized_keys
$ chmod 0600 ~/.ssh/authorized_keys
```



Let's verify key based login. Below command should not ask for the password but the first time it will prompt for adding RSA to the list of known hosts.

```
$ ssh localhost

$ exit
```

Setting up Java

Download jdk-8u201-linux-x64.tar from oracle jdk download website.
After downloading the tar file, move into the downloaded folder and extract the tar file by using below command

$tar –xvf jdk-8u201-linux-x64.tar
Next, we need to set environment variables used by Hadoop. Edit ~/.bashrc file and append following values at end of file as shown below to setup java.

```
hdpuser@hdpuser-VirtualBox:~$
hdpuser@hdpuser-VirtualBox:~$ sudo gedit ~/.bashrc
[sudo] password for hdpuser:

** (gedit:11921): WARNING **: 21:33:14.725: Set document metadata failed: Setting attribu
hdpuser@hdpuser-VirtualBox:~$ sudo gedit ~/.bashrc
```

Open *.bashrc ~/ Save

```
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi

export JAVA_HOME=/home/hdpuser/installations/jdk-8/jdk1.8.0_201
```

Now you can verify java setup by executin the below command
$java –version

```
hdpuser@hdpuser-VirtualBox:~$ java -version
java version "1.8.0_201"
Java(TM) SE Runtime Environment (build 1.8.0_201-b09)
Java HotSpot(TM) 64-Bit Server VM (build 25.201-b09, mixed mode)
hdpuser@hdpuser-VirtualBox:~$
```

Setting up Hadoop

Step 1) Download Hadoop from the Apache Download Mirrors and extract the contents of the Hadoop package to a location of your choice. I have picked **/home/hdpuser/installations/.**

Extract the hadoop tar file by using below command and move into the selected directory

$tar -xvf Downloads/hadoop-2.7.7.tar
$cp –R Downloads/hadoop-2.7.7 /home/hdpuser/installations

Now we need to edit **.basrc** file and set the hadoop variable as shown in below screen

```
hdpuser@hdpuser-VirtualBox:~$ gedit ~/.bashrc
```

.bashrc
~/

```
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi

export JAVA_HOME=/home/hdpuser/installations/jdk-8/jdk1.8.0_201
export HADOOP_HOME=/home/hdpuser/installations/hadoop-2.7.7
export HIVE_HOME=/home/hdpuser/installations/apache-hive-1.2.2
export PATH=$PATH:$JAVA_HOME/bin:$HADOOP_HOME/bin:$HADOOP_HOME/sbin:$HIVE_HOME/bin
```

sh Tab Width: 8 Ln 122, Col 83 INS

Edit Configuration Files

Hadoop has many of configuration files, which need to configure as per requirements to setup Hadoop infrastructure. Let's start with the configuration with basic Hadoop single node cluster setup. first, navigate to below location

$cd $HADOOP_HOME/etc/hadoop

```
hdpuser@hdpuser-VirtualBox:~/installations/hadoop-2.7.7$ cd etc/hadoop/
hdpuser@hdpuser-VirtualBox:~/installations/hadoop-2.7.7/etc/hadoop$ ls
capacity-scheduler.xml  hadoop-metrics2.properties  httpfs-signature.secret  log4j.properties           ssl-client.xml.example
configuration.xsl       hadoop-metrics.properties   httpfs-site.xml          mapred-env.cmd             ssl-server.xml.example
container-executor.cfg  hadoop-policy.xml           kms-acls.xml             mapred-env.sh              yarn-env.cmd
core-site.xml           hdfs-site.xml               kms-env.sh               mapred-queues.xml.template yarn-env.sh
hadoop-env.cmd          httpfs-env.sh               kms-log4j.properties     mapred-site.xml            yarn-site.xml
hadoop-env.sh           httpfs-log4j.properties     kms-site.xml             slaves
hdpuser@hdpuser-VirtualBox:~/installations/hadoop-2.7.7/etc/hadoop$
```

The following files will have to be modified to complete the Hadoop setup

/home/hdpuser/installations/hadoop-2.7.7/etc/hadoop/hadoop-env.sh

/home/hdpuser/installations/hadoop-2.7.7/etc/hadoop/core-site.xml

/home/hdpuser/installations/hadoop-2.7.7/etc/hadoop/mapred-site.xml.template

/home/hdpuser/installations/hadoop-2.7.7/etc/hadoop/hdfs-site.xml

/home/hdpuser/installations/hadoop-2.7.7/etc/hadoop/yarn-site.xml

Open **core-site.xml** and edit the property mentioned below inside configuration tag:
core-site.xml informs Hadoop daemon where Name Node runs in the cluster. It contains configuration settings of Hadoop core such as I/O settings that are common to HDFS & Mapreduce. Edited and added properties as shown below

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
  Licensed under the Apache License, Version 2.0 (the "License");
  you may not use this file except in compliance with the License.
  You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

  Unless required by applicable law or agreed to in writing, software
  distributed under the License is distributed on an "AS IS" BASIS,
  WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
  See the License for the specific language governing permissions and
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
 <property>
        <name>fs.defaultFS</name>
        <value>hdfs://localhost:8020</value>
    </property>
</configuration>
```

Edit **hdfs-site.xml** and edit the property mentioned below inside configuration tag:
hdfs-site.xml contains configuration settings of HDFS daemons (i.e. Name Node, Data Node, Secondary Name Node). It also includes the replication factor and block size of HDFS.

```
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
     <property>
        <name>dfs.replication</name>
        <value>1</value>
    </property>
    <property>
        <name>dfs.namenode.name.dir</name>
        <value>/home/hdpuser/hadoop-data/name</value>
    </property>
    <property>
        <name>dfs.datanode.data.dir</name>
        <value>/home/hdpuser/hadoop-data/data</value>
    </property>
</configuration>
```

Edit the **mapred-site.xml** file and edit the property mentioned below inside configuration tag:
mapred-site.xml contains configuration settings of Mapreduce application like number of JVM that can run in parallel, the size of the mapper and the reducer process, CPU cores available for a process, etc.

In some cases, mapred-site.xml file is not available. So, we have to create the mapred-site.xml file using mapred-site.xml template.

```
  limitations under the License. See accompanying LICENSE file.
-->

<!-- Put site-specific property overrides in this file. -->

<configuration>
<property>
        <name>mapreduce.framework.name</name>
        <value>yarn</value>
    </property>
</configuration>
```

Edit **yarn-site.xml** and edit the property mentioned below inside configuration tag:
yarn-site.xml contains configuration settings of Resource Manager and Node Manager like application memory management size, the operation needed on program & algorithm, etc.

```
  limitations under the License. See accompanying LICENSE file.
-->
<configuration>

<!-- Site specific YARN configuration properties -->
<property>
        <name>yarn.nodemanager.aux-services</name>
        <value>mapreduce_shuffle</value>
    </property>

</configuration>
```

i.

Edit **hadoop-env.sh** and add the Java Path as mentioned below:
hadoop-env.sh contains the environment variables that are used in the script to run Hadoop like Java home path, etc.

```
# Set Hadoop-specific environment variables here.

# The only required environment variable is JAVA_HOME.  All others are
# optional.  When running a distributed configuration it is best to
# set JAVA_HOME in this file, so that it is correctly defined on
# remote nodes.

# The java implementation to use.
export JAVA_HOME=/home/hdpuser/installations/jdk-8/jdk1.8.0_201

# The jsvc implementation to use. Jsvc is required to run secure datanodes
# that bind to privileged ports to provide authentication of data transfer
# protocol.  Jsvc is not required if SASL is configured for authentication of
# data transfer protocol using non-privileged ports.
```

Format the HDFS File system and Starting Hadoop server

The first step to starting your Hadoop installation is the formatting of the Hadoop file system (HDFS) implemented on top of your local file system of your cluster. This step is required the first time you set up a Hadoop cluster. Do not format a running Hadoop file system as you will lose all the data currently in the cluster (in HDFS)!

- To format the file system (which simply initializes the directory specified by the dfs.namenode.name.dir variable), execute the following command in the $HADOOP_HOME/bin directory

  $hdfs namenode -format

```
hduser_@guru99-VirtualBox:~$  $HADOOP_HOME/bin/hdfs namenode -format
14/05/05 13:01:58 INFO namenode.NameNode: STARTUP_MSG:
/************************************************************
STARTUP_MSG: Starting NameNode
STARTUP_MSG:   host = guru99-VirtualBox/127.0.1.1
STARTUP_MSG:   args = [-format]
STARTUP_MSG:   version = 2.2.0
STARTUP_MSG:   classpath = /home/guru99/Downloads/hadoop/etc/hadoop:/home/guru99
/Downloads/hadoop/share/hadoop/common/lib/activation-1.1.jar:/home/guru99/Downlo
ads/hadoop/share/hadoop/common/lib/netty-3.6.2.Final.jar:/home/guru99/Downloads/
hadoop/share/hadoop/common/lib/protobuf-java-2.5.0.jar:/home/guru99/Downloads/ha
doop/share/hadoop/common/lib/xmlenc-0.52.jar:/home/guru99/Downloads/hadoop/share
/hadoop/common/lib/jsp-api-2.1.jar:/home/guru99/Downloads/hadoop/share/hadoop/co
mmon/lib/commons-collections-3.2.1.jar:/home/guru99/Downloads/hadoop/share/hadoo
p/common/lib/avro-1.7.4.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/li
b/jackson-core-asl-1.8.8.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/l
ib/commons-io-2.1.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/lib/jers
ey-core-1.9.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/lib/commons-co
dec-1.4.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/lib/mockito-all-1.
8.5.jar:/home/guru99/Downloads/hadoop/share/hadoop/common/lib/commons-cli-1.2.ja
r:/home/guru99/Downloads/hadoop/share/hadoop/common/lib/jets3t-0.6.1.jar:/home/g
uru99/Downloads/hadoop/share/hadoop/common/lib/guava-11.0.2.jar:/home/guru99/Dow
nloads/hadoop/share/hadoop/common/lib/commons-net-3.1.jar:/home/guru99/Downloads
/hadoop/share/hadoop/common/lib/commons-httpclient-3.1.jar:/home/guru99/Download
```

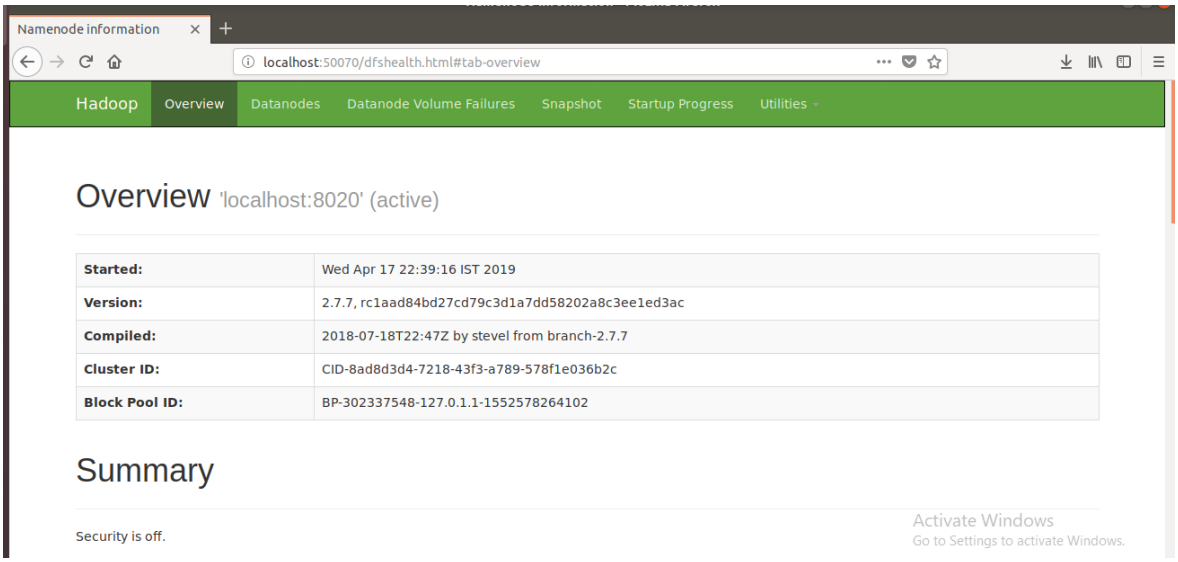
Start Hadoop single node cluster using below command

$start-all.sh

```
hdpuser@hdpuser-VirtualBox:~$ jps
13083 Jps
hdpuser@hdpuser-VirtualBox:~$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [localhost]
localhost: starting namenode, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/hadoop-hdpuser-namenode-hdpuser-VirtualBox.out
```

```
hdpuser@hdpuser-VirtualBox:~$ jps
13083 Jps
hdpuser@hdpuser-VirtualBox:~$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [localhost]
localhost: starting namenode, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/hadoop-hdpuser-namenode-hdpuser-VirtualBox.out
localhost: starting datanode, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/hadoop-hdpuser-datanode-hdpuser-VirtualBox.out
Starting secondary namenodes [0.0.0.0]
0.0.0.0: starting secondarynamenode, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/hadoop-hdpuser-secondarynamenode-hdpuser-Virtual
Box.out
starting yarn daemons
starting resourcemanager, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/yarn-hdpuser-resourcemanager-hdpuser-VirtualBox.out
localhost: starting nodemanager, logging to /home/hdpuser/installations/hadoop-2.7.7/logs/yarn-hdpuser-nodemanager-hdpuser-VirtualBox.out
hdpuser@hdpuser-VirtualBox:~$
hdpuser@hdpuser-VirtualBox:~$ jps
14002 NodeManager
13426 DataNode
13844 ResourceManager
14040 Jps
13625 SecondaryNameNode
13273 NameNode
hdpuser@hdpuser-VirtualBox:~$
```

Now we can browse the hdfs using our web browser with URL **http://localhost:50070**



If you want to stop the hadoop services we can do that with the below command

$stop-all.sh

```
hdpuser@hdpuser-VirtualBox:~$ jps
3585 NodeManager
2995 DataNode
3427 ResourceManager
2836 NameNode
12331 Jps
3197 SecondaryNameNode
5086 org.eclipse.equinox.launcher_1.3.201.v20161025-1711.jar
hdpuser@hdpuser-VirtualBox:~$ stop-all.sh
This script is Deprecated. Instead use stop-dfs.sh and stop-yarn.sh
Stopping namenodes on [localhost]
localhost: stopping namenode
localhost: stopping datanode
Stopping secondary namenodes [0.0.0.0]
0.0.0.0: stopping secondarynamenode
stopping yarn daemons
stopping resourcemanager
localhost: stopping nodemanager
no proxyserver to stop
```

Now the hadoop single node cluster is ready and running.Next step is to configure Hive.

HIVE CONFIGURATION

Introduction

Apache Hive is a data warehouse infrastructure built on top of Hadoop for providing data summarization, query, and analysis. Apache Hive supports analysis of large datasets stored in Hadoop's HDFS and compatible file systems such as Amazon S3 file system. It provides an SQL-like language called HiveQL(Hive Query Language) while maintaining full support for map/reduce.

Installing HIVE:

- Browse to the link: http://apache.claz.org/hive/stable/ to download the hive
- Click the apache-hive-1.2.2-bin.tar.gz
- Save and Extract it

Commands

hdpuser@hdpuser-VirtualBox:~$tar –xvf Downloads/apache-hive-1.2.2-bin.tar.gz

hdpuser@hdpuser-VirtualBox:~$ sudo mkdir /home/hdpuser/installations/apache-hive-1.2.2
hdpuser@hdpuser-VirtualBox:~$ cp -R Downloads/ apache-hive-1.2.2-bin/* /home/hdpuser/installations/apache-hive-1.2.2/

Setting Hive environment variable:

Commands

hdpuser@hdpuser-VirtualBox:~$ cd
hdpuser@hdpuser-VirtualBox:~$ sudo gedit ~/.bashrc
Copy and paste the following lines at end of the file

```
# Set HIVE_HOME
export HIVE_HOME=/home/hdpuser/installations/apache-hive-1.2.2
PATH=$PATH:$HIVE_HOME/bin
export PATH
```

Setting HADOOP_PATH in HIVE config.sh

Commands

hdpuser@hdpuser-VirtualBox:~$ cd /usr/lib/hive/apache-hive-0.13.0-bin/bin
hdpuser@hdpuser-VirtualBox:~$ sudo gedit hive-config.sh
Go to the line where the following statements are written

```
# Allow alternate conf dir location.
HIVE_CONF_DIR="${HIVE_CONF_DIR:-$HIVE_HOME/conf"
export HIVE_CONF_DIR=$HIVE_CONF_DIR
export HIVE_AUX_JARS_PATH=$HIVE_AUX_JARS_PATH
```

Below this write the following

export HADOOP_HOME=/usr/local/hadoop (write the path where hadoop file is there)

Create Hive directories within HDFS

Command

```
hdpuser@hdpuser-VirtualBox:~$   hadoop fs -mkdir /usr/hive/warehouse
```

Setting READ/WRITE permission for table

Command

```
hdpuser@hdpuser-VirtualBox:~$  hadoop fs -chmod g+w /usr/hive/warehouse
```

HIVE launch

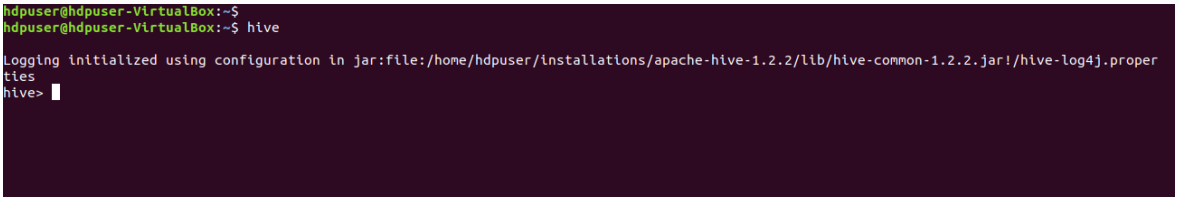
Command

```
hdpuser@hdpuser-VirtualBox:~$  hive
```

Hive shell will prompt:

OUTPUT

Shell will look like



Creating a database

Command

```
hive> create database mydb;
```

OUTPUT

```
OK

Time taken: 0.369 seconds
hive>
```

If we get the above output we can confirm that the have has been configured successfully.

DATA PROCESSING TASK

Up to now we have configured the hadoop and its eco systems/tools required to get that data into hadoop and process that data. So now the first thing to do here is getting the data into HDFS and then analyze using hive. By using **load data local inpath** query of hive we directly load data from local file system to HDFS which will be directly pointed to hive table that we load data into.

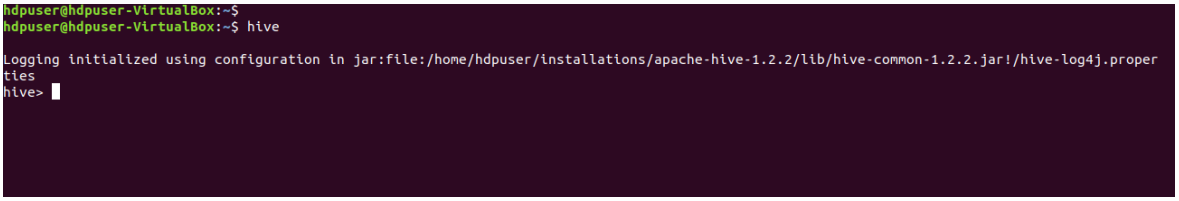
Below are the scripts to load data into Hive and Analyze the data.

Analyzing the data with Hive

Now we have the data in hadoop distributed file system (HDFS), so we have to load and process this data in hive now. For this we have to execute the following script in Hive Shell
First enter into Hive shell using the following command

```
$Hive
```

Shell will look like



In this Hive shell we have to run our following scripts

SCRIPTS TO RUN

create table customers(customer_id bigint,first_name string,last_name string,userid string,password string,email string,gender string) row format delimited fields terminated by ',' tblproperties ("skip.header.line.count"="1");

load data local inpath '/home/hdpuser/Desktop/ecommerce-data/Customers.csv' into table customers;

create table customer_address(customer_id bigint,street_address string,city string,state string,country string,zipcode bigint,contact_number string)row format delimited fields terminated by ',' tblproperties ("skip.header.line.count"="1");

load data local inpath '/home/hdpuser/Desktop/ecommerce-data/Address.csv' into table customer_address;

create table orders(order_id bigint,customer_id bigint,order_date timestamp,order_status string)row format delimited fields terminated by ',' ;

load data local inpath '/home/hdpuser/Desktop/ecommerce-data/orders.csv' into table orders;

create table orders_details(order_details_id bigint,order_id bigint,product_id bigint)row format delimited fields terminated by ',' ;

```
load data local inpath '/home/hdpuser/Desktop/ecommerce-data/order_details.csv' into
table orders_details;

create table products(product_id bigint,product_name string,product_category_tree
string,retail_price int,discounted_price int,product_rating double,brand string) ROW
FORMAT SERDE 'org.apache.hadoop.hive.serde2.OpenCSVSerde' tblproperties
("skip.header.line.count"="1");

load data local inpath '/home/hdpuser/Desktop/ecommerce-data/ProductsData.csv' into
table products;

---below 2 queries are for preprocessing

create or replace view products_cat as select product_id,
product_name,split(substr(product_category_tree,3,length(product_category_tree)-4)," >>
")  as category_tree,retail_price ,discounted_price, product_rating, brand from products;

create or replace view products_sub_cat as select cast(product_id as bigint) product_id,
product_name,category_tree[0] category_name,category_tree[1]
sub_category1,category_tree[2] sub_category2,cast(retail_price as int)
retail_price,cast(discounted_price as int) discounted_price, cast (product_rating as float)
product_rating, brand from products_cat;



set hive.groupby.orderby.position.alias=true;

--
select a.category_name,count(*) total from products_sub_cat a,orders o,orders_details od
where o.order_id=od.order_id and od.product_id=a.product_id group by
a.category_name;

select a.category_name,count(*) total from products_sub_cat a,orders o,orders_details od
where o.order_id=od.order_id and od.product_id=a.product_id group by a.category_name
order by total desc limit 10;

*select a.category_name,sum(discounted_price) total from products_sub_cat a,orders
o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id group
by a.category_name order by total limit 10;

*select a.product_name,sum(discounted_price) total from products_sub_cat a,orders
o,orders_details od where category_name ='Mobiles & Accessories' and
o.order_id=od.order_id and od.product_id=a.product_id group by a.product_name order
by total limit 10;
```

***select a.product_name,count(*) total from products_sub_cat a,orders o,orders_details od where category_name ='Mobiles & Accessories' and o.order_id=od.order_id and od.product_id=a.product_id group by a.product_name;**

select city,count(*) from customers c,customer_address ca where ca.customer_id=c.customer_id group by city;

select state,count(*) from customers c,customer_address ca where ca.customer_id=c.customer_id group by state;

select city,sum(discounted_price) from products_sub_cat a,customer_address ca,orders o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id and o.customer_id = ca.customer_id group by city;

select state,sum(discounted_price) from products_sub_cat a,customer_address ca,orders o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id and o.customer_id = ca.customer_id group by state;

select if(month(order_date)<=3,'Q1',if(month(order_date)<=6,'Q2', if(month(order_date)<=9,'Q3','Q4'))) as Quarter,count(*) from orders group by 1;

select if(month(order_date)<=3,'Q1',if(month(order_date)<=6,'Q2', if(month(order_date)<=9,'Q3','Q4'))) as Quarter,count(*) from orders group by if(month(order_date)<=3,'Q1',if(month(order_date)<=6,'Q2', if(month(order_date)<=9,'Q3','Q4')));

***select state,sum(discounted_price) total_sum from products_sub_cat a,customer_address ca,orders o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id and o.customer_id = ca.customer_id group by state order by total_sum desc limit 10;**

***select city,sum(discounted_price) total_sum from products_sub_cat a,customer_address ca,orders o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id and o.customer_id = ca.customer_id group by city order by total_sum desc limit 10;**

select date_format(order_date,'MMMM') month,count(*) from orders group by date_format(order_date,'MMMM');

***select state,sum(discounted_price) from products_sub_cat a,customer_address ca,orders o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id and o.customer_id = ca.customer_id and a.category_name='clothing' group by state limit 10;**

[

```
select sub_category1,sum(discounted_price) from products_sub_cat a,customer_address
ca,orders o,orders_details od where o.order_id=od.order_id and
od.product_id=a.product_id and o.customer_id = ca.customer_id and
a.category_name='Clothing' group by sub_category1;


select product_name,product_rating from products_sub_cat where
category_name='Clothing' and product_rating > 4


---to export the query results to local file which is used in tableau reports

insert overwrite local directory '/home/hdpuser/Desktop/hiveoutput' row format delimited
fields terminated by ',' select if(month(order_date)<=3,'Q1',if(month(order_date)<=6,'Q2',
if(month(order_date)<=9,'Q3','Q4'))) as Quarter,count(*) from orders group by
if(month(order_date)<=3,'Q1',if(month(order_date)<=6,'Q2',
if(month(order_date)<=9,'Q3','Q4')));

insert overwrite local directory '/home/hdpuser/Desktop/hiveoutput/statewise_customers'
row format delimited fields terminated by ',' select state,count(*) from customers
c,customer_address ca where ca.customer_id=c.customer_id group by state;


insert overwrite local directory '/home/hdpuser/Desktop/hiveoutput/categorywise_sale/'
row format delimited fields terminated by ',' select a.category_name,count(*) total from
products_sub_cat a,orders o,orders_details od where o.order_id=od.order_id and
od.product_id=a.product_id group by a.category_name order by total desc limit 10;

insert overwrite local directory '/home/hdpuser/Desktop/hiveoutput/categorywise_sale/'
row format delimited fields terminated by '@@' select
a.category_name,sum(discounted_price) total from products_sub_cat a,orders
o,orders_details od where o.order_id=od.order_id and od.product_id=a.product_id group
by a.category_name order by total limit 10;
```

5. OUTPUT SCREENS

TABLES

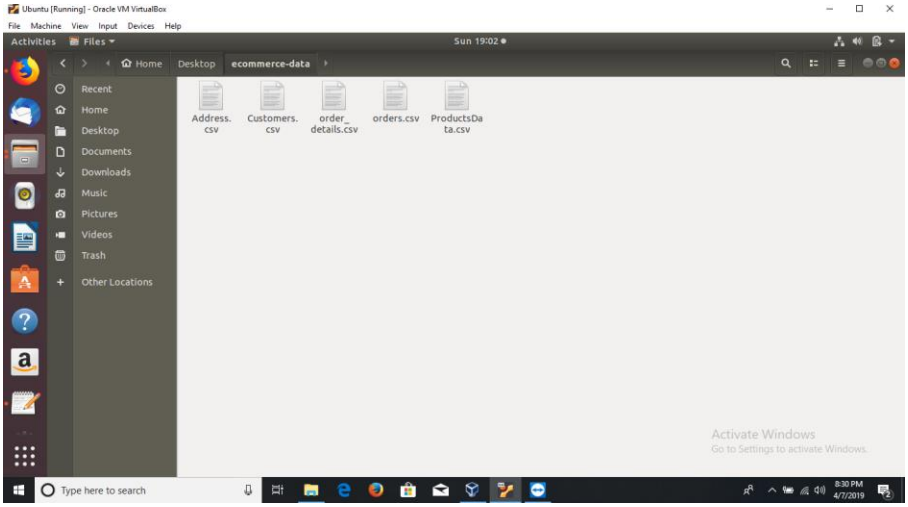


Fig. 11. Tables

STRUCTURE OF TABLES

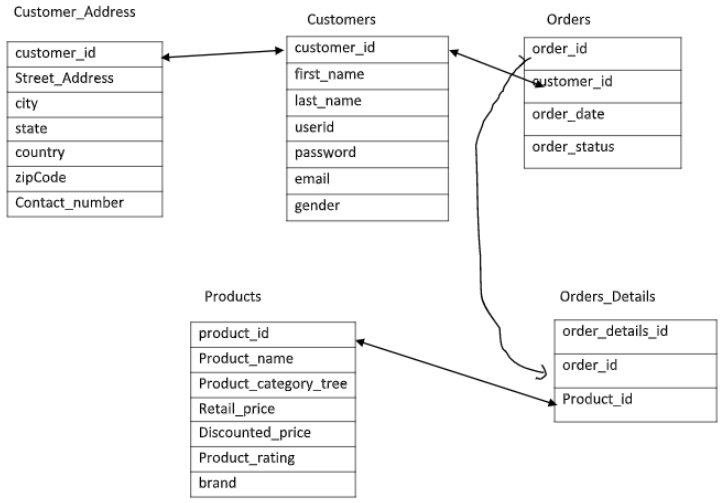


Fig.12. structure of tables

STATEWISE ORDERS

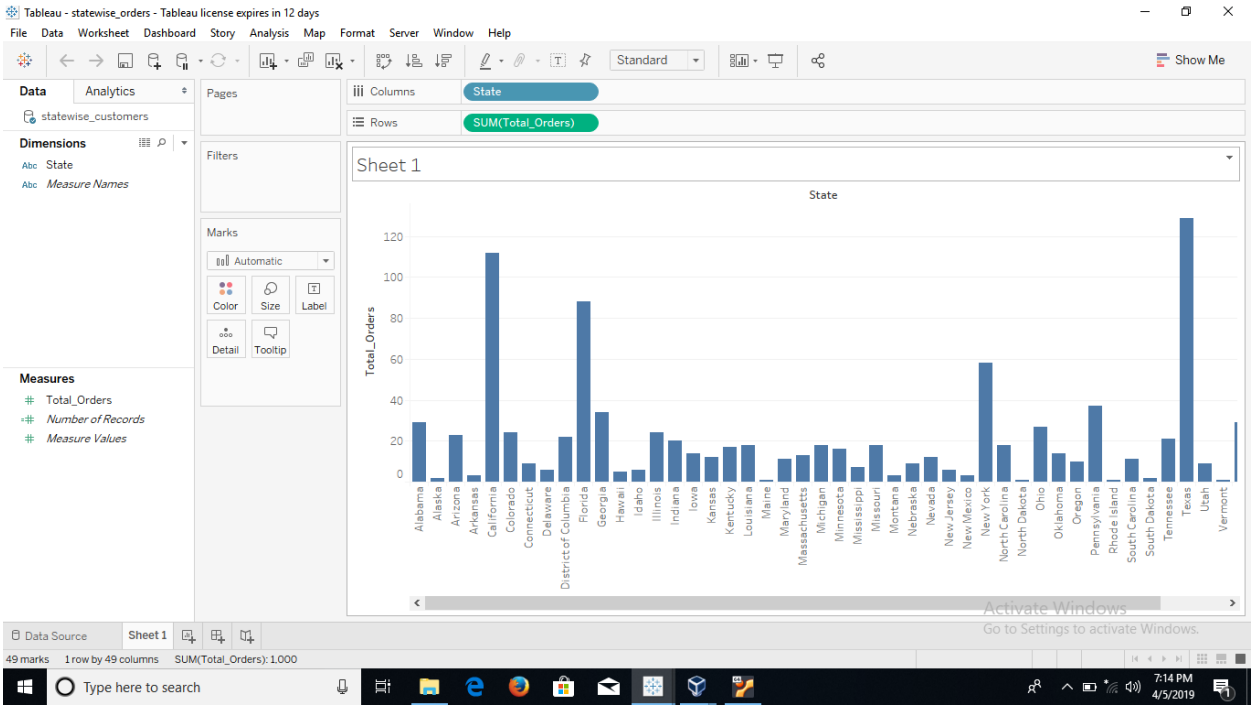


Fig. 13. State wise orders

TOTAL AMOUNT COLLECTED FOR TOP TEN CATEGORIES

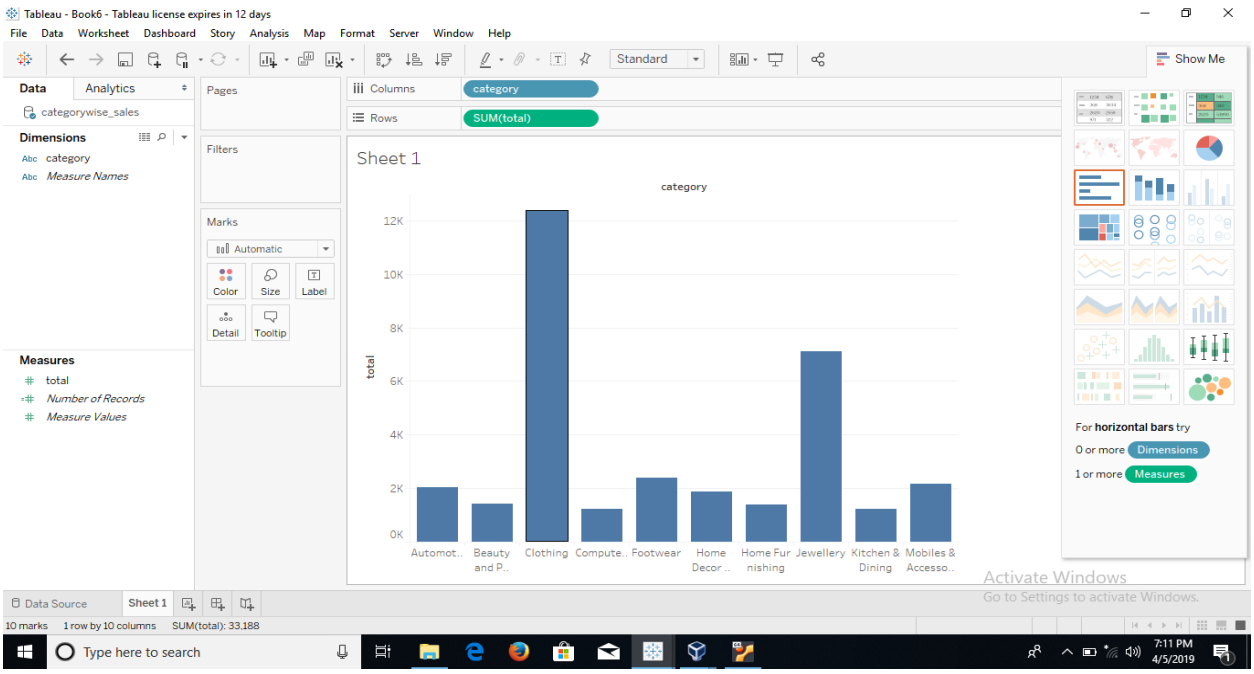


Fig. 14. Total amount collected for top ten categories

QUARTER WISE SALES

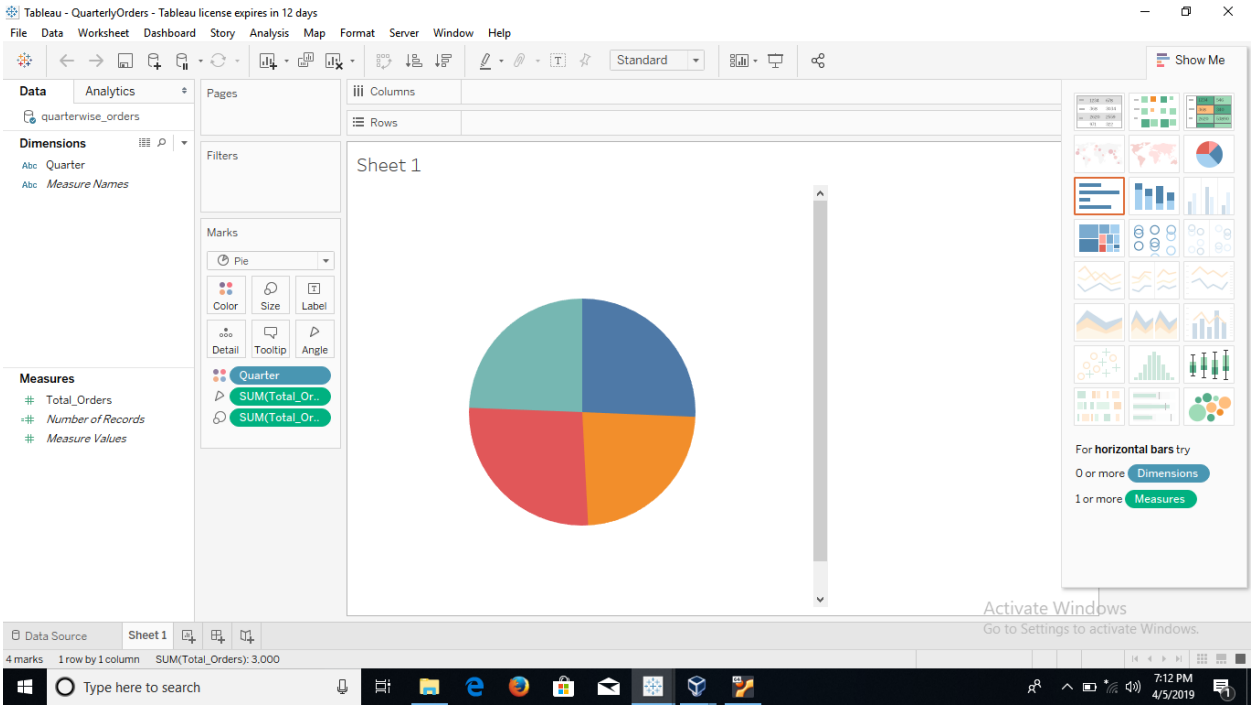


Fig. 15. Quarter wise sales

TOP TEN CITIES WITH HIGHEST NUMBER OF ORDERS

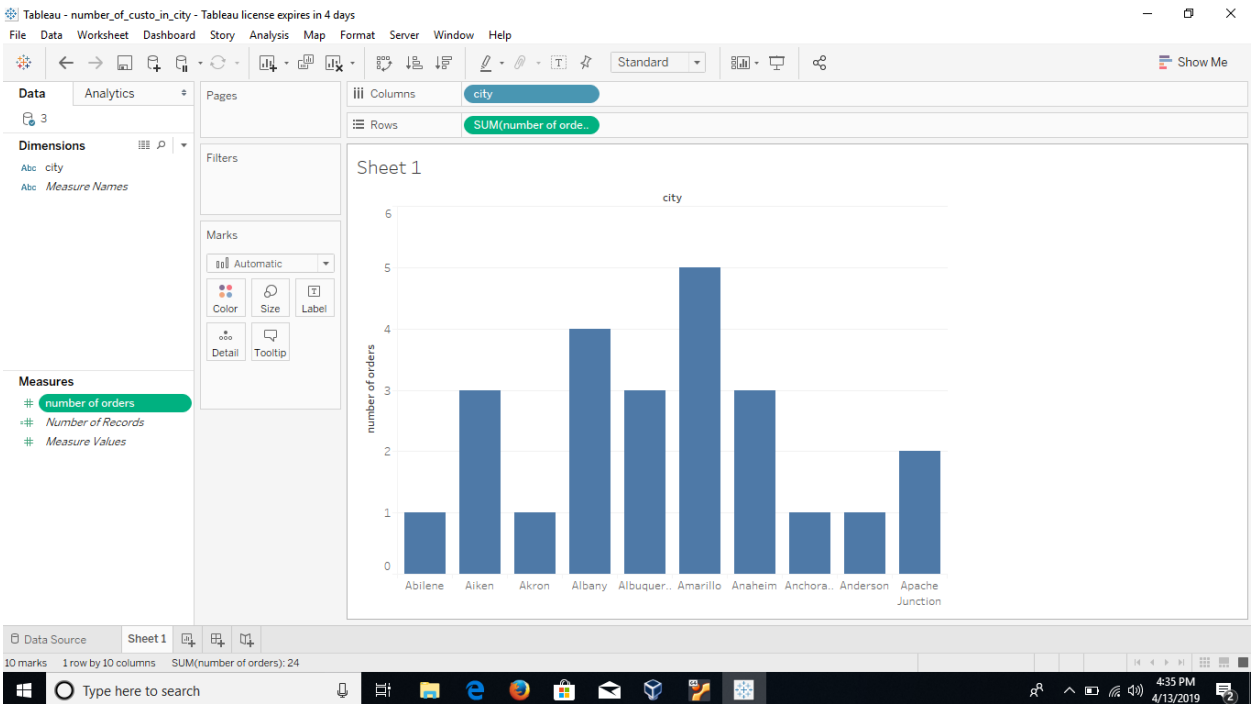


Fig. 16. Top ten cities with highest number of orders

TOP TEN STATES WITH HIGHEST NUMBER OF ORDERS

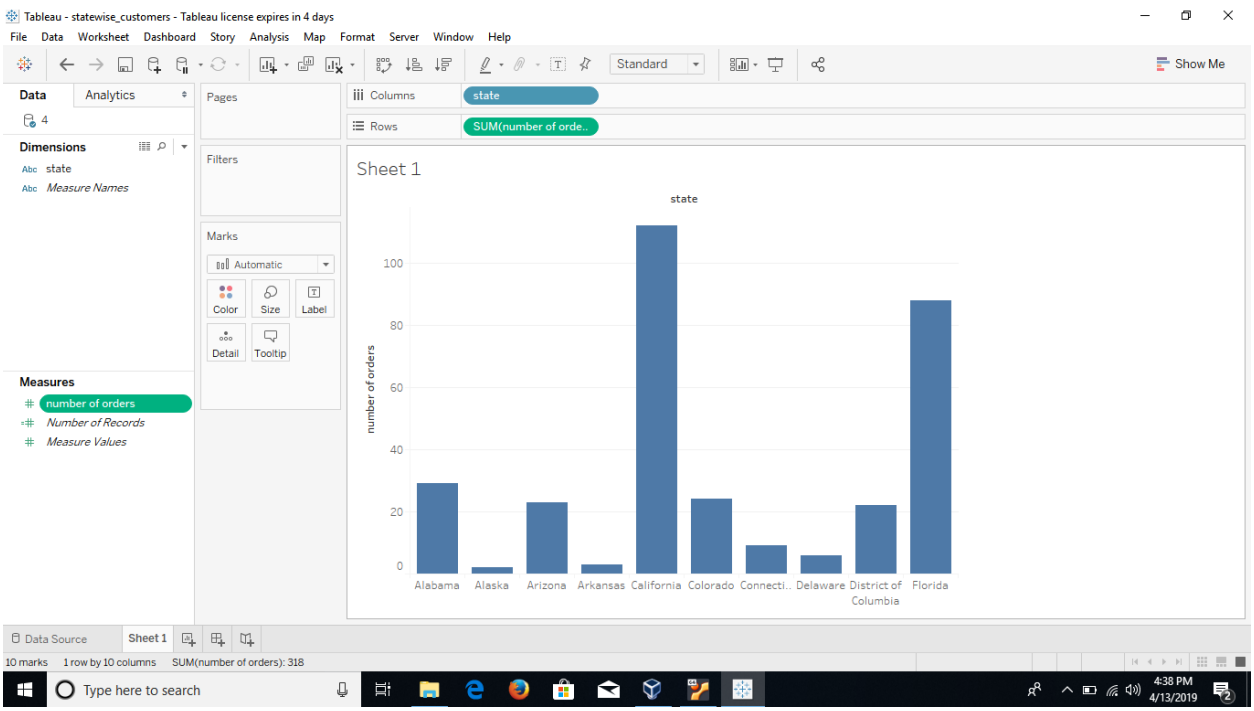
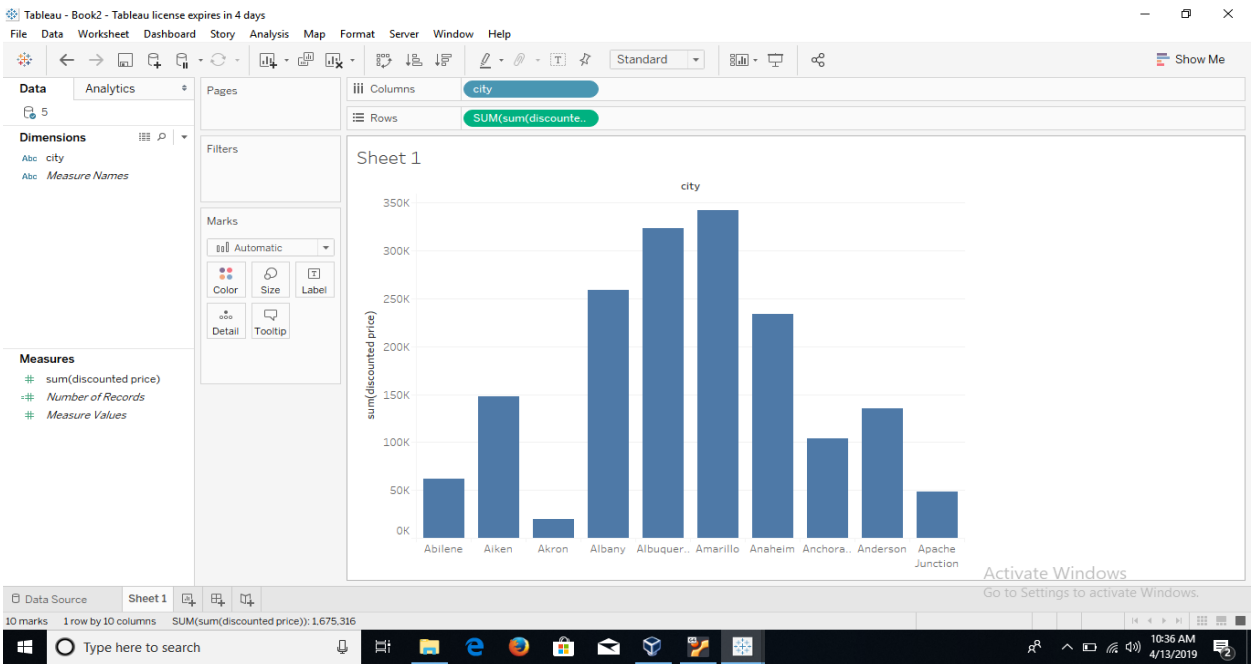


Fig. 17. Top ten states with highest number of orders

TOP TEN CITIES WITH HIGHEST DISCOUNTED PRICE



TOP TEN STATES WITH HIGHEST DISCOUNTED PRICE

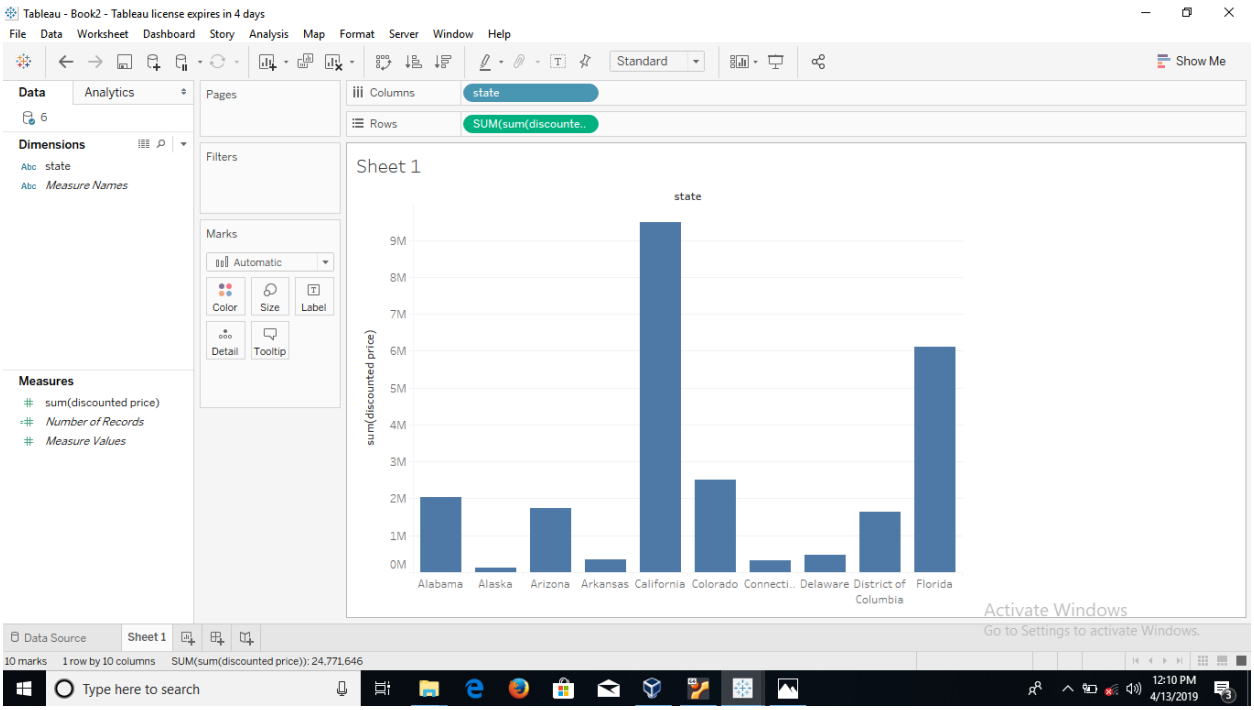


Fig. 19. Top ten states with highest discounted price

TOTAL AMOUNT COLLECTED ON SALES EACH MONTH

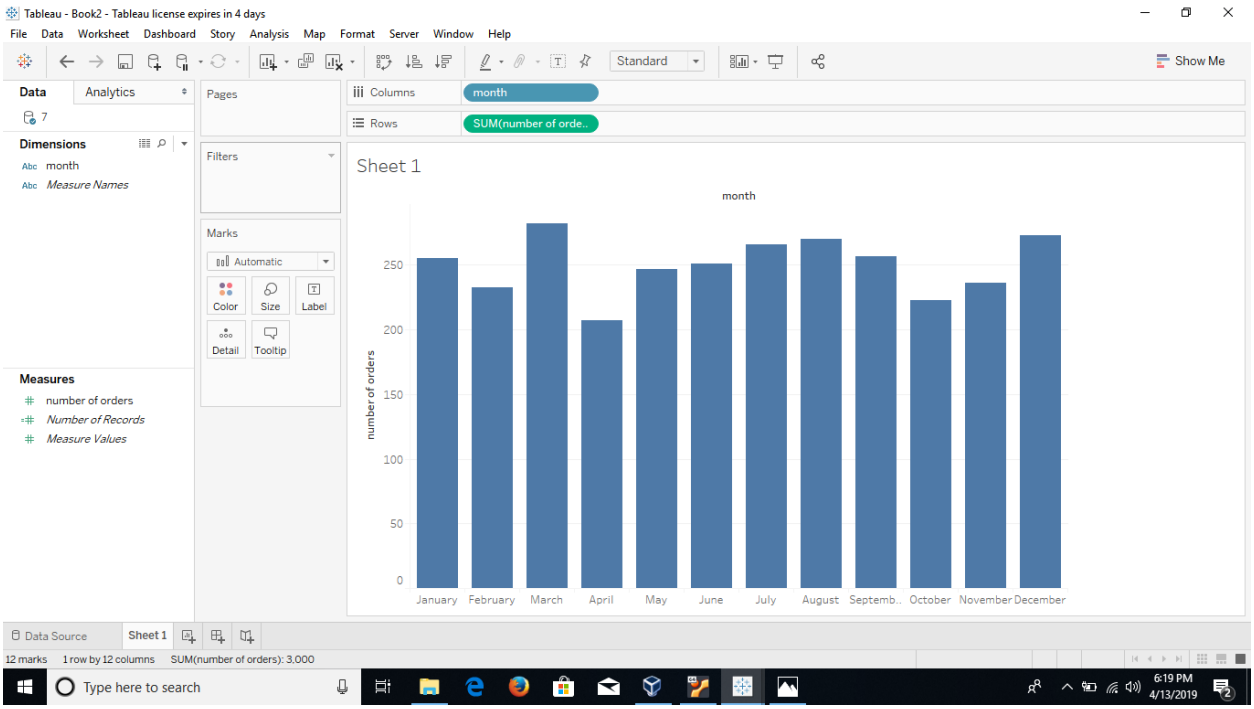


Fig. 20. Total amount collected on sales each month

TOP TEN HIGHEST CATEGORIES IN SUB CATEGORY

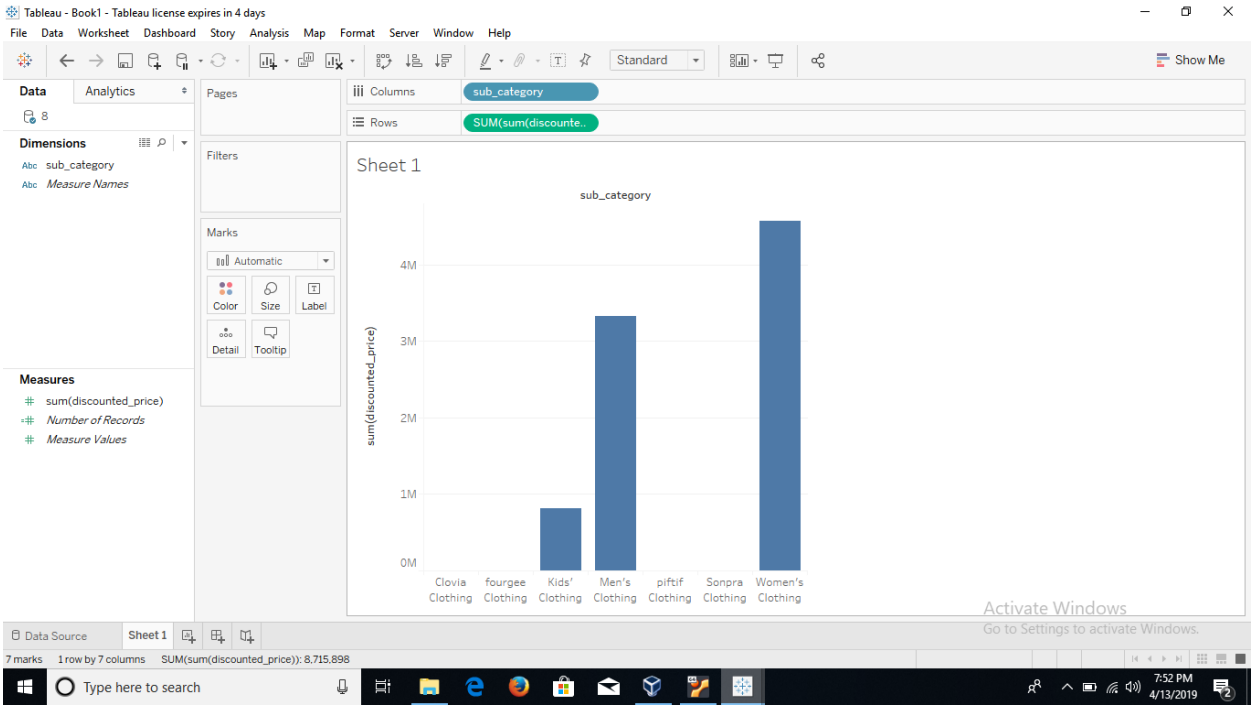


Fig. 21. Top ten highest categories in sub category

TOP TEN HIGHEST RATING PRODUCTS

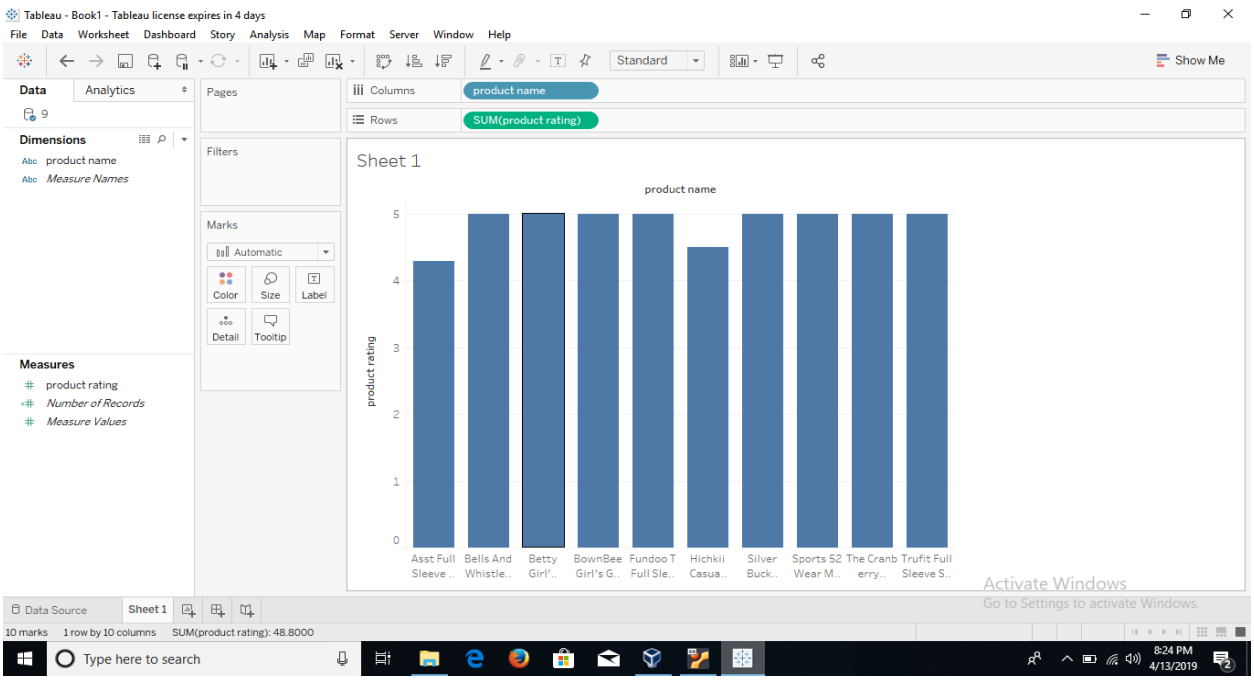


Fig. 22. Top ten highest rating products

TOP TEN PRODUCTS WITH HIGHEST DISCOUNTED PRICE

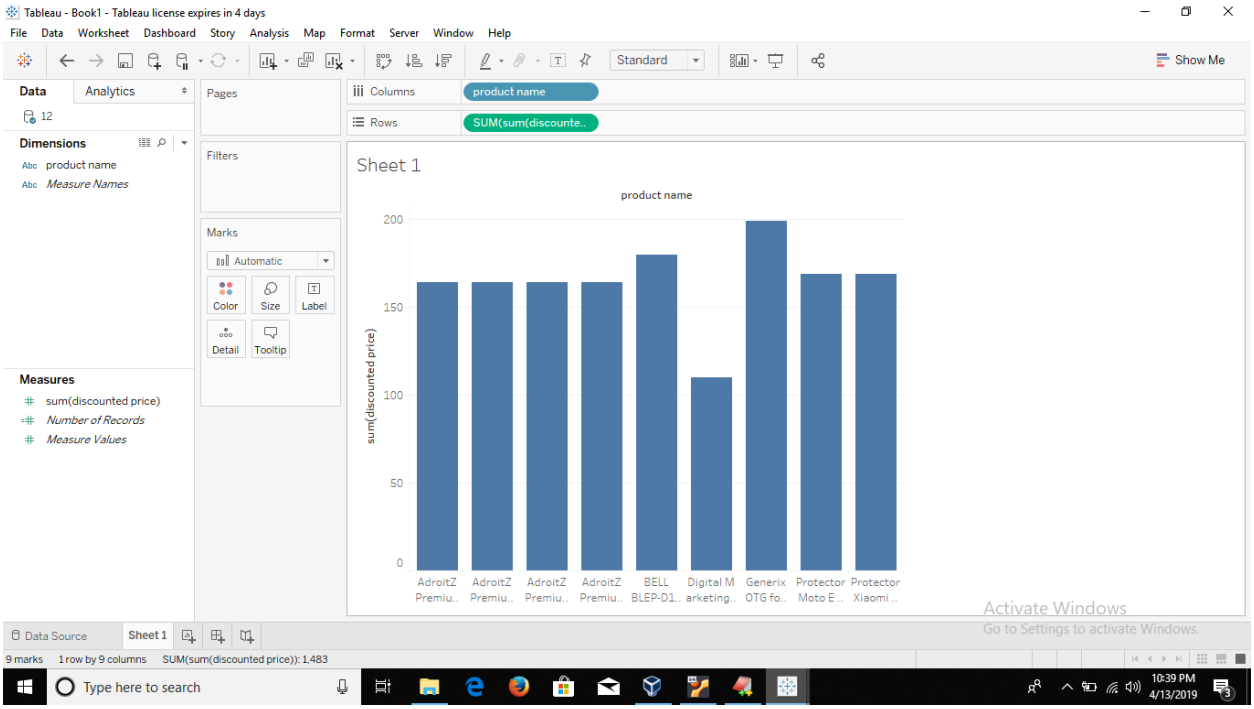


Fig. 23. Top ten products with highest discounted price

TOP TEN CATEGORIES HAVING HIGHEST RECORDS

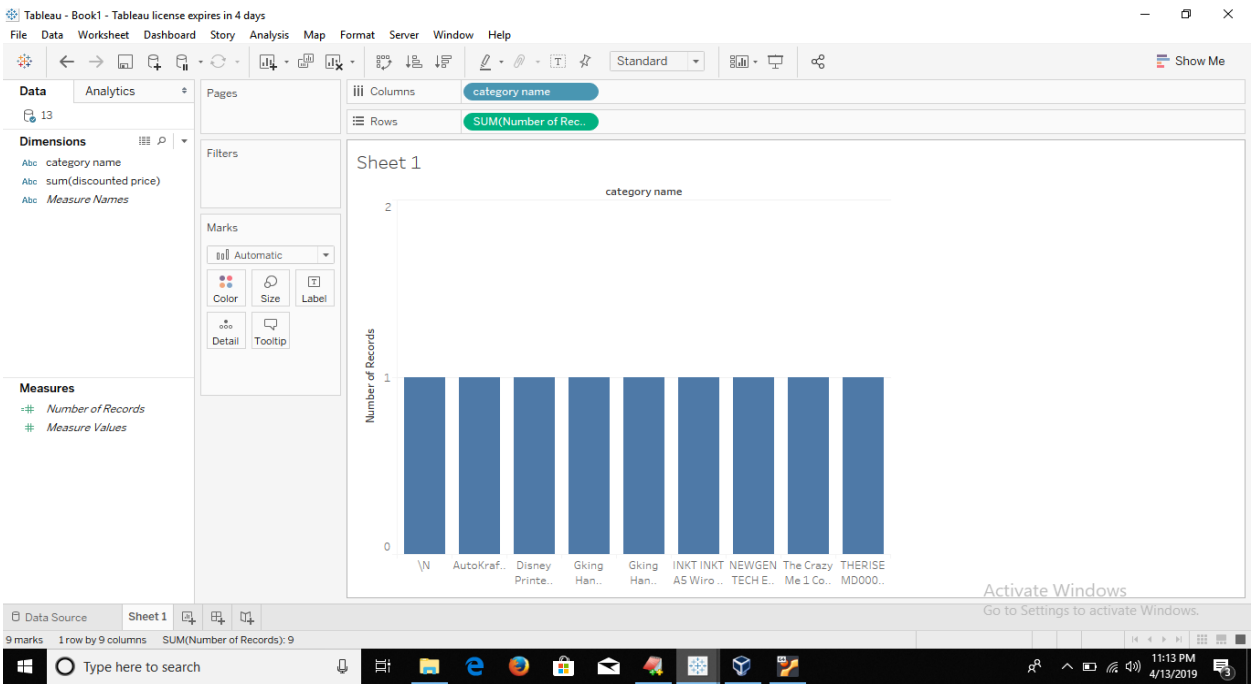


Fig. 24. Top ten categories having highest records

TOP TEN PRODUCTS WITH HIGHEST DISCOUNTED PRICE

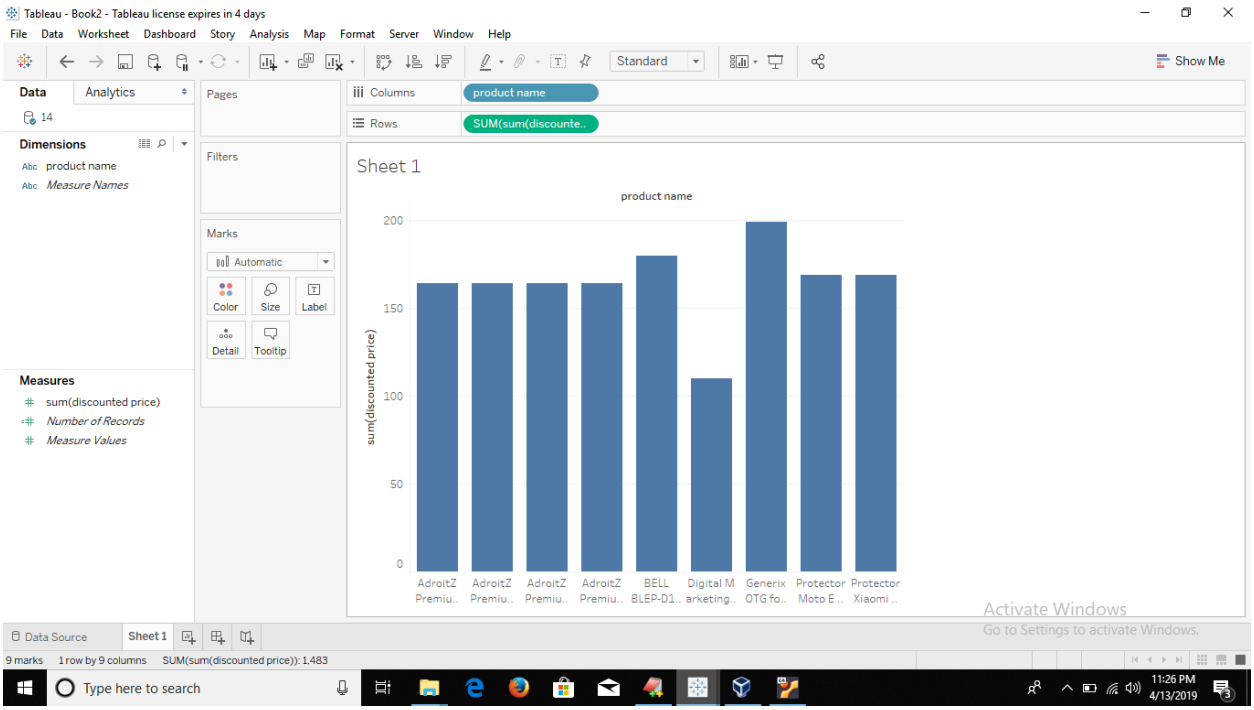


Fig. 25. Top ten products with highest discounted price

TOP TEN PRODUCTS HAVING HIGHEST RECORDS

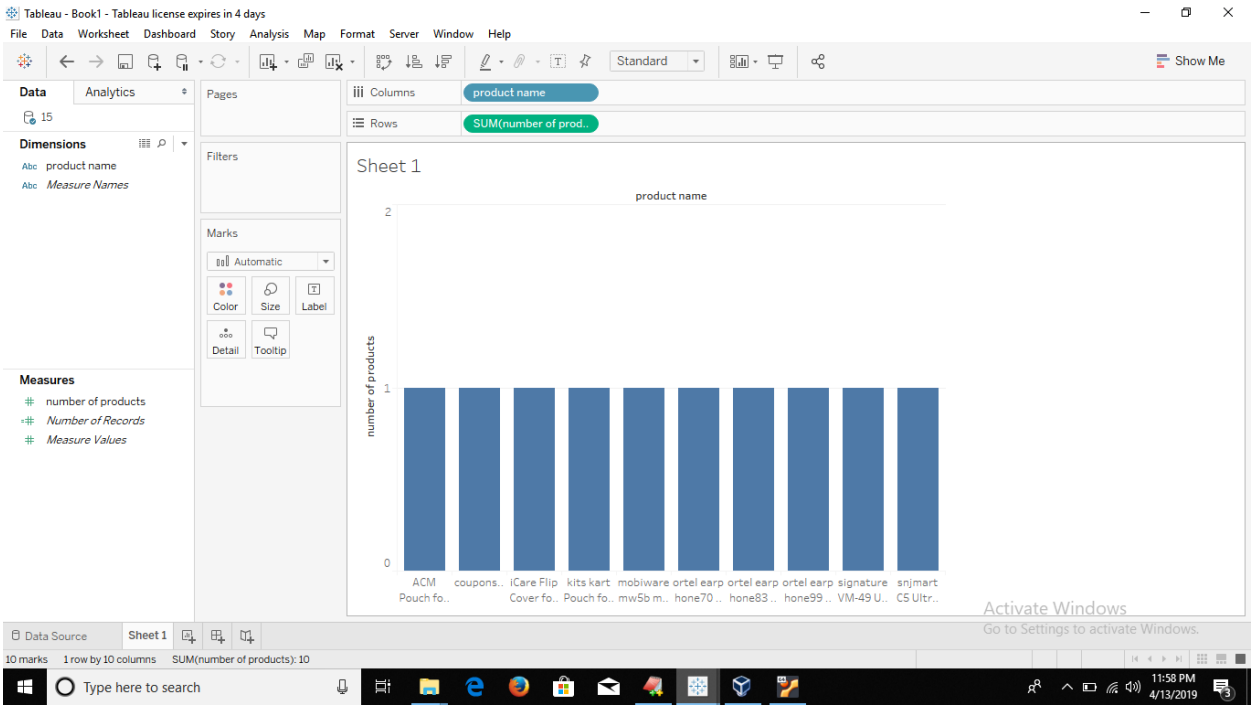


Fig. 26. Top ten products having highest records

TOP TEN STATES WITH HIGHEST TOTAL DISCOUNTED PRICE

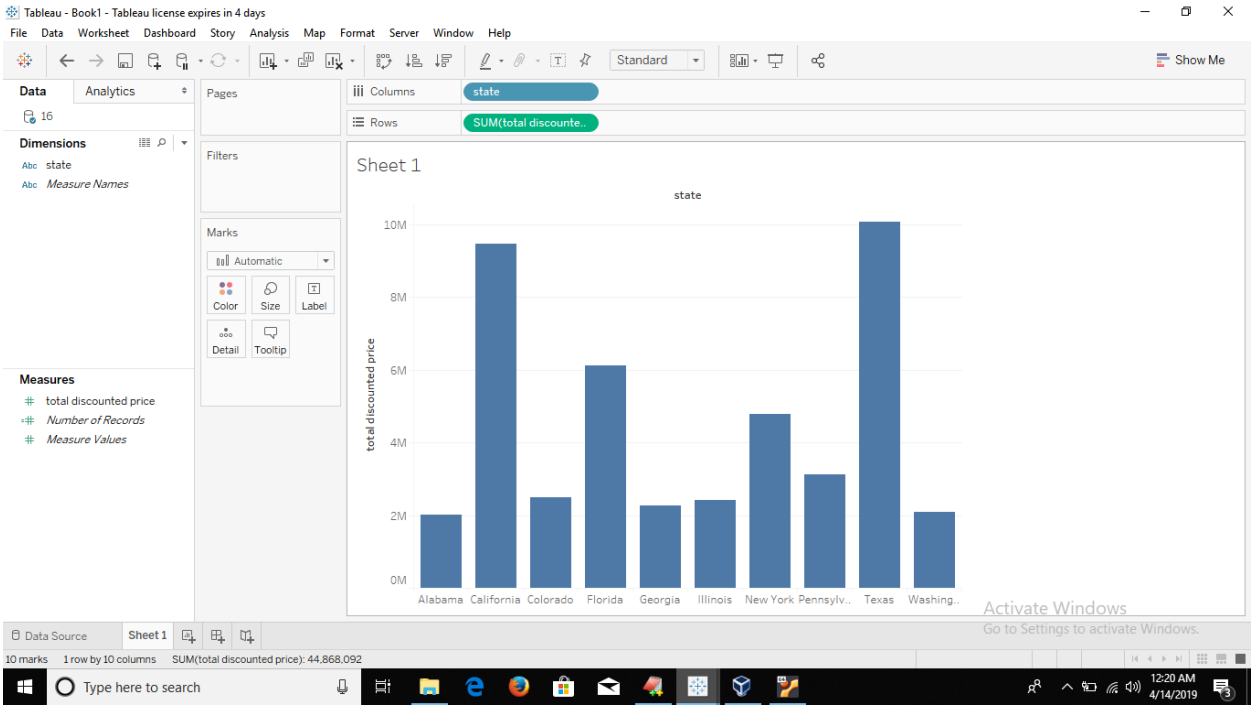


Fig. 27. Top ten states with highest total discounted price

TOP TEN CITIES WITH HIGHEST TOTAL DISCOUNTED PRICE

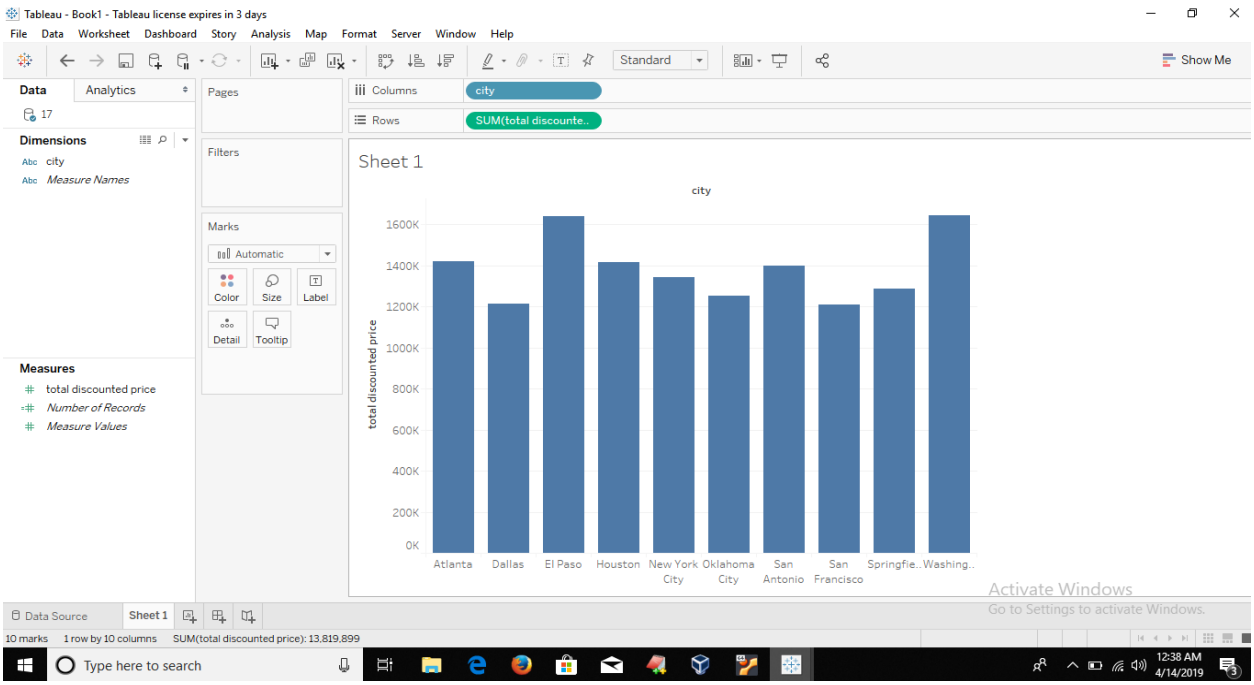
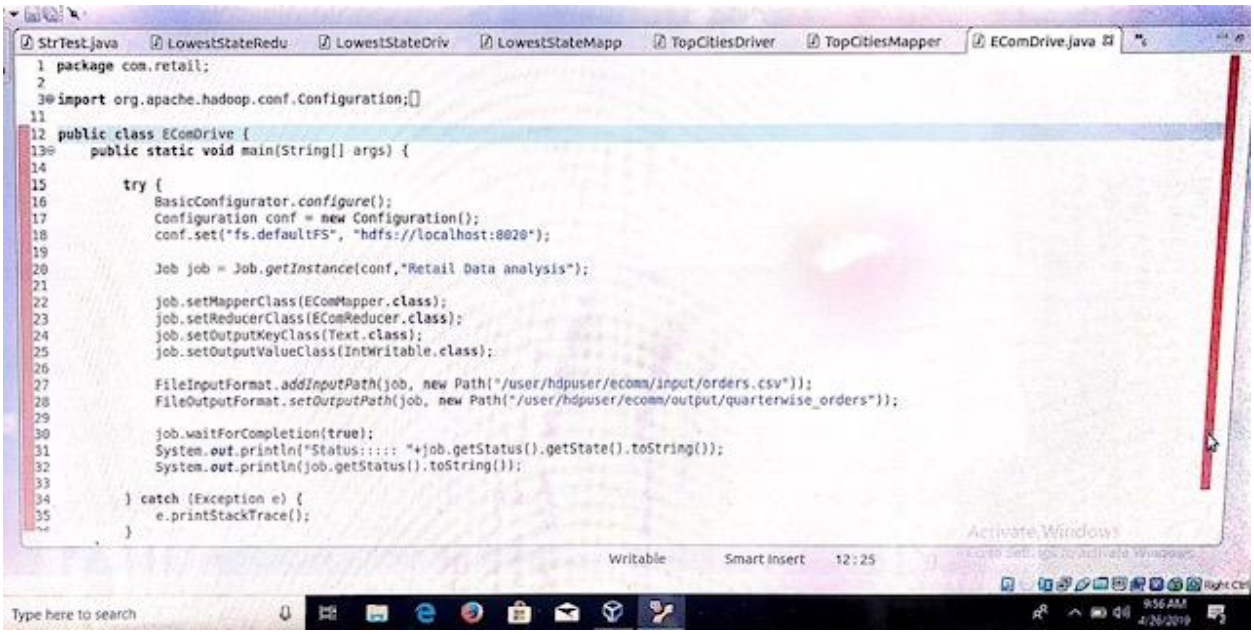


Fig. 28. Top ten cities with highest total discounted price

USING MAPREDUCE PROGRAMS

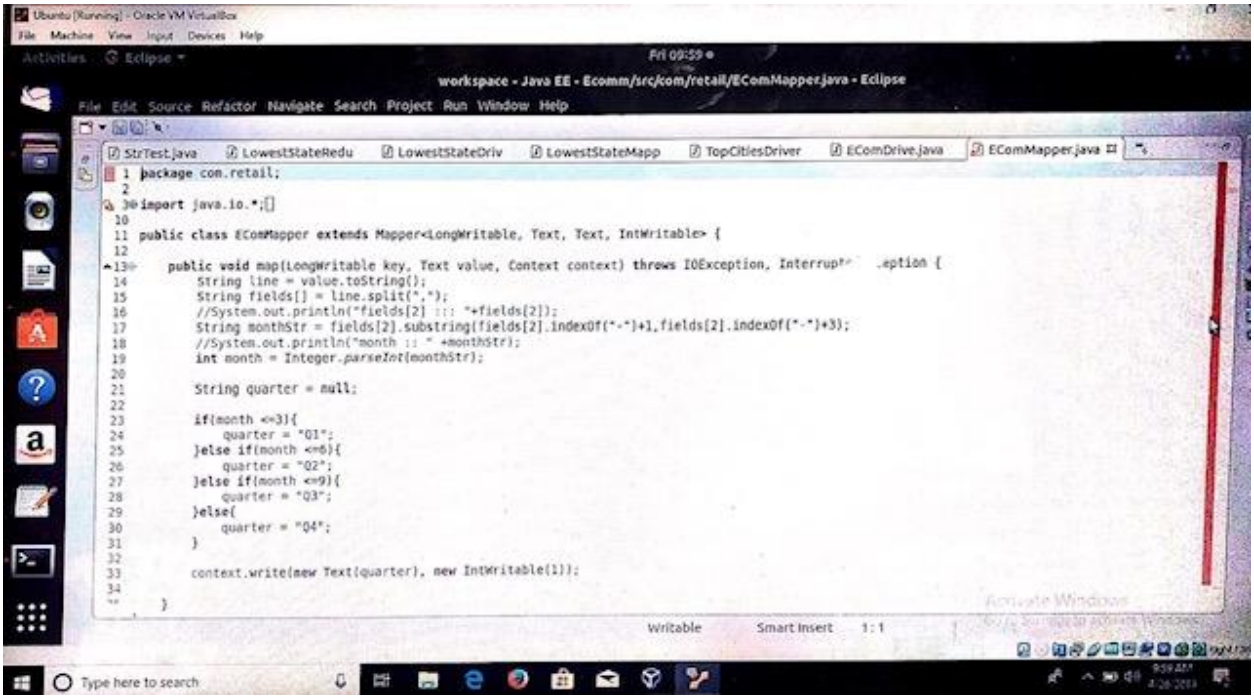
QUARTERWISE SALES

- DRIVER CLASS



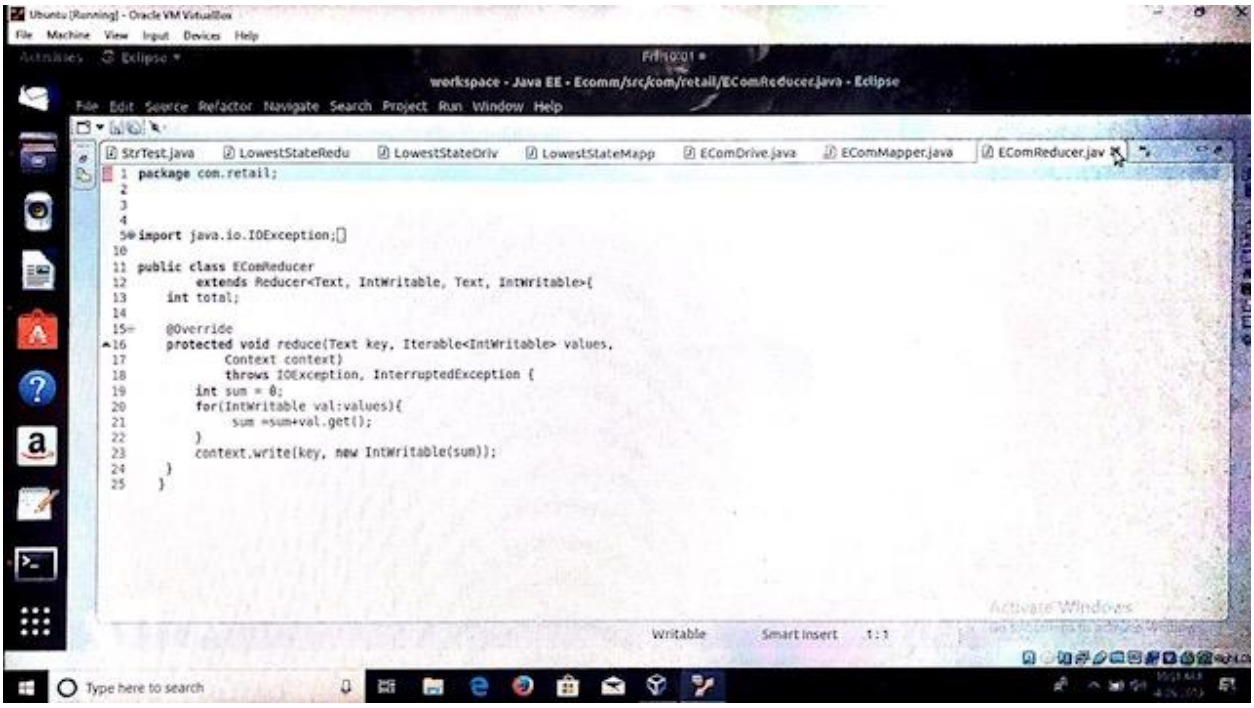
```
package com.retail;

import org.apache.hadoop.conf.Configuration;

public class EComDrive {
    public static void main(String[] args) {

        try {
            BasicConfigurator.configure();
            Configuration conf = new Configuration();
            conf.set("fs.defaultFS", "hdfs://localhost:8020");

            Job job = Job.getInstance(conf,"Retail Data analysis");

            job.setMapperClass(EComMapper.class);
            job.setReducerClass(EComReducer.class);
            job.setOutputKeyClass(Text.class);
            job.setOutputValueClass(IntWritable.class);

            FileInputFormat.addInputPath(job, new Path("/user/hdpuser/ecomm/input/orders.csv"));
            FileOutputFormat.setOutputPath(job, new Path("/user/hdpuser/ecomm/output/quarterwise_orders"));

            job.waitForCompletion(true);
            System.out.println("Status:::: "+job.getStatus().getState().toString());
            System.out.println(job.getStatus().toString());

        } catch (Exception e) {
            e.printStackTrace();
        }
```

- MAPPER CLASS

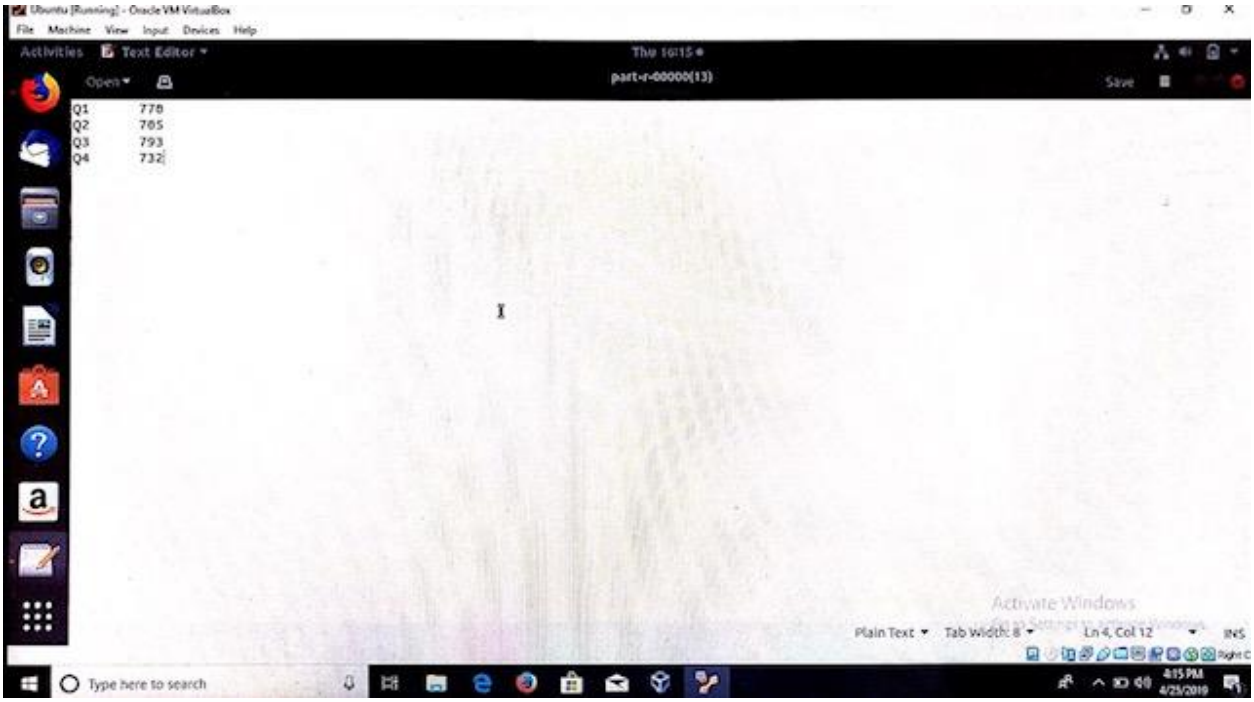


```
package com.retail;

import java.io.*;

public class EComMapper extends Mapper<LongWritable, Text, Text, IntWritable> {

    public void map(LongWritable key, Text value, Context context) throws IOException, Interrup   eption {
        String line = value.toString();
        String fields[] = line.split(",");
        //System.out.println("fields[2] ::: "+fields[2]);
        String monthStr = fields[2].substring(fields[2].indexOf("-")+1,fields[2].indexOf("-")+3);
        //System.out.println("month :: " +monthStr);
        int month = Integer.parseInt(monthStr);

        String quarter = null;

        if(month <=3){
            quarter = "Q1";
        }else if(month <=6){
            quarter = "Q2";
        }else if(month <=9){
            quarter = "Q3";
        }else{
            quarter = "Q4";
        }

        context.write(new Text(quarter), new IntWritable(1));

    }
```

- REDUCER CLASS

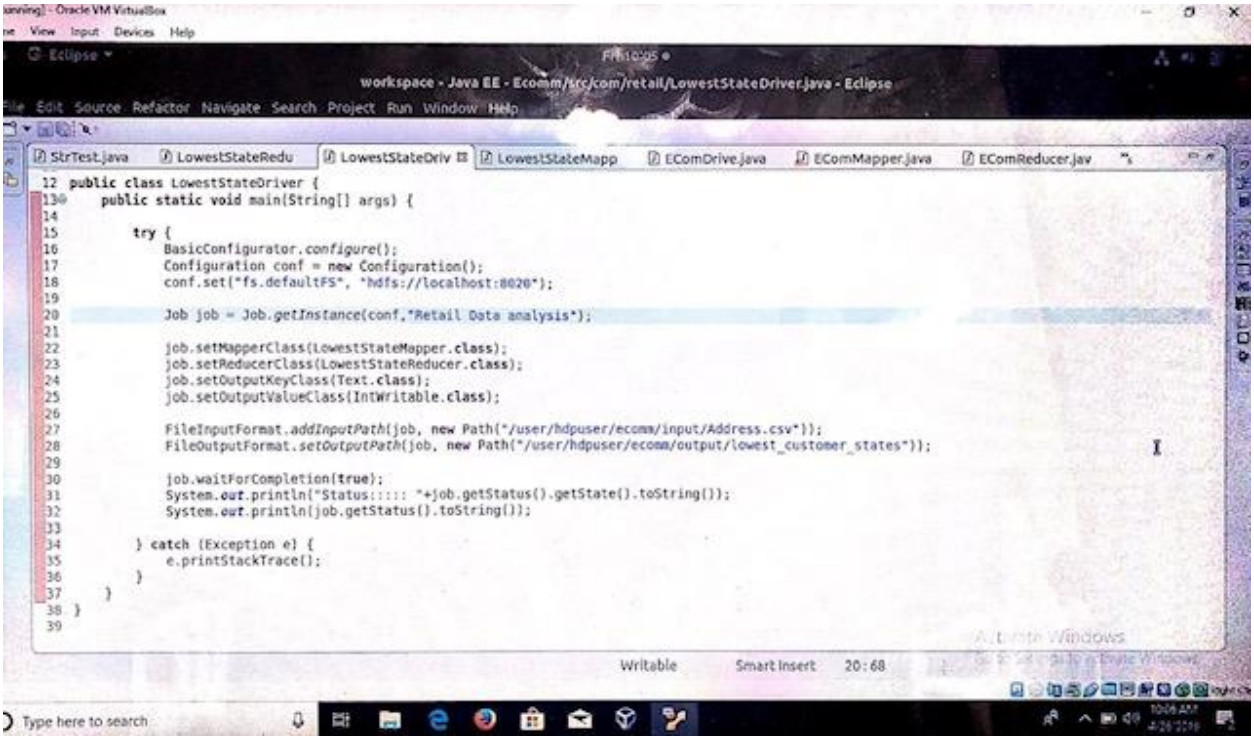


OUTPUT:

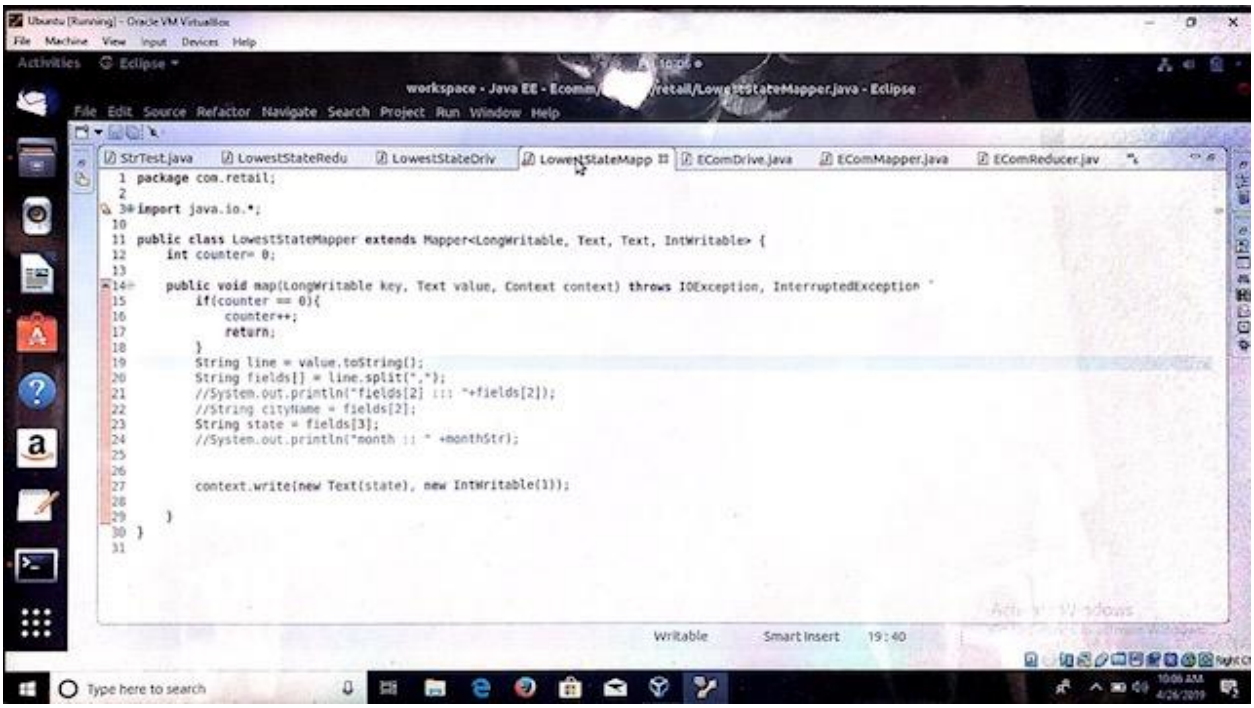


LOWEST STATES

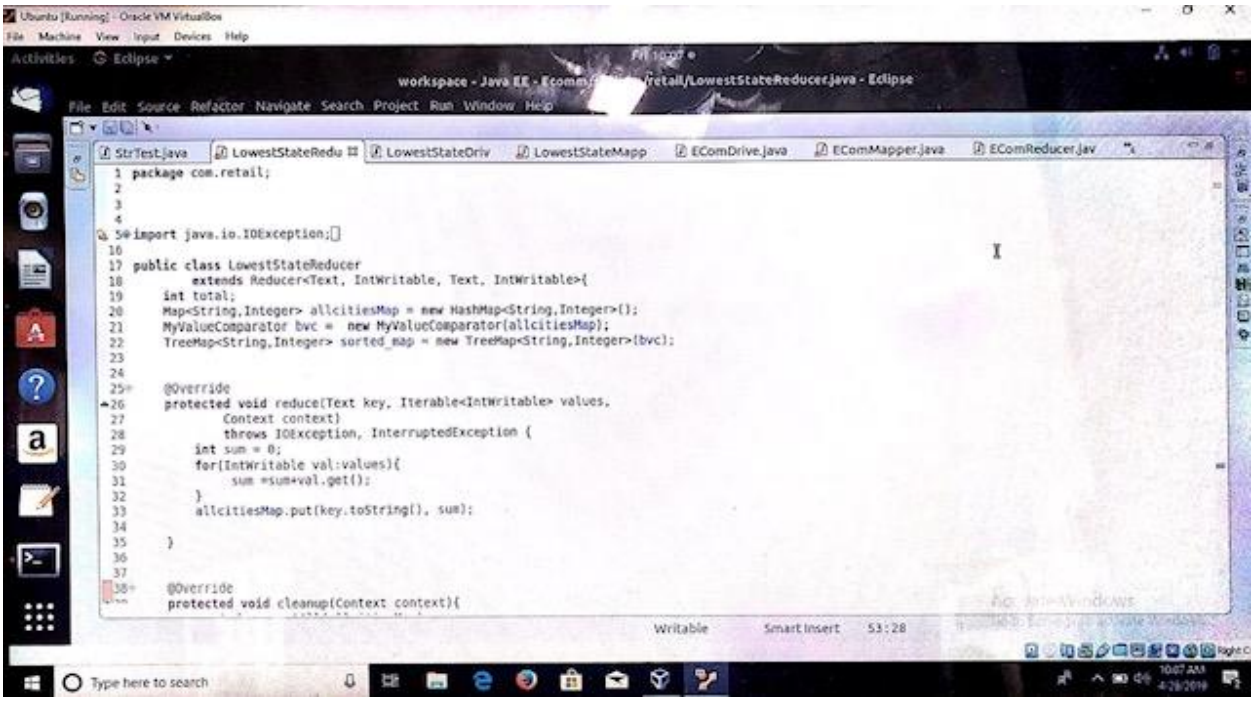
- DRIVER CLASS



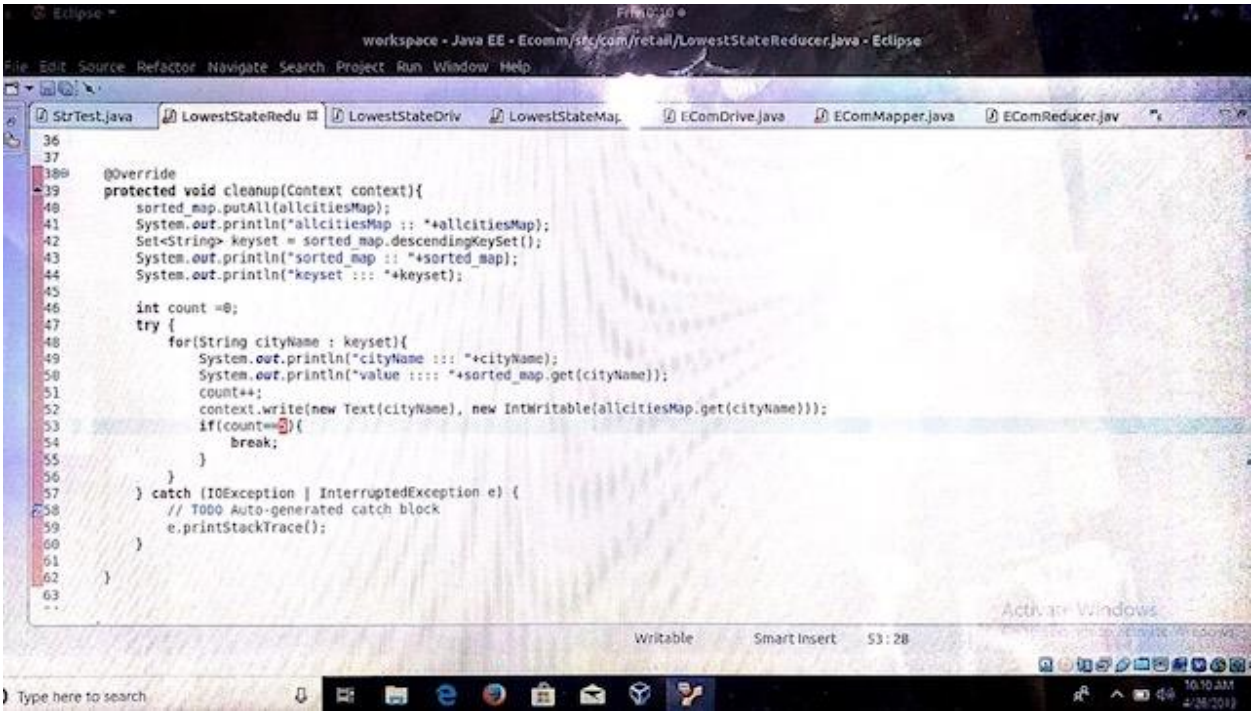
- MAPPER CLASS



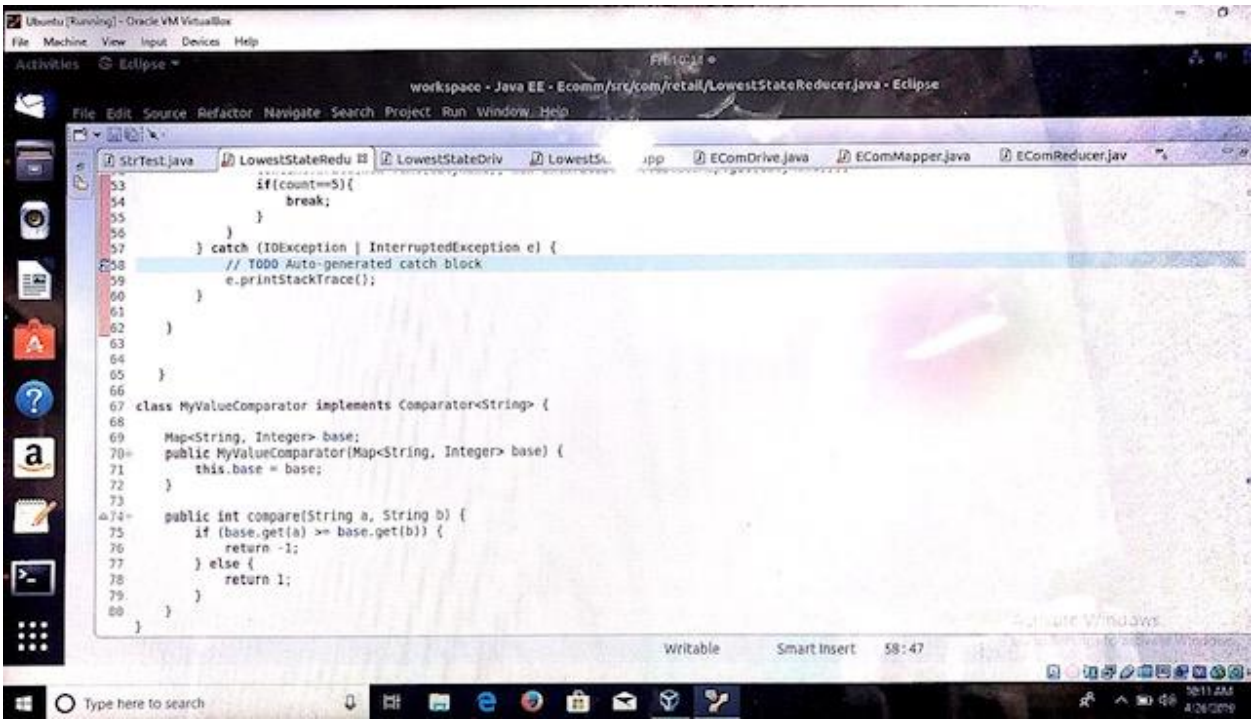
- REDUCER CLASS



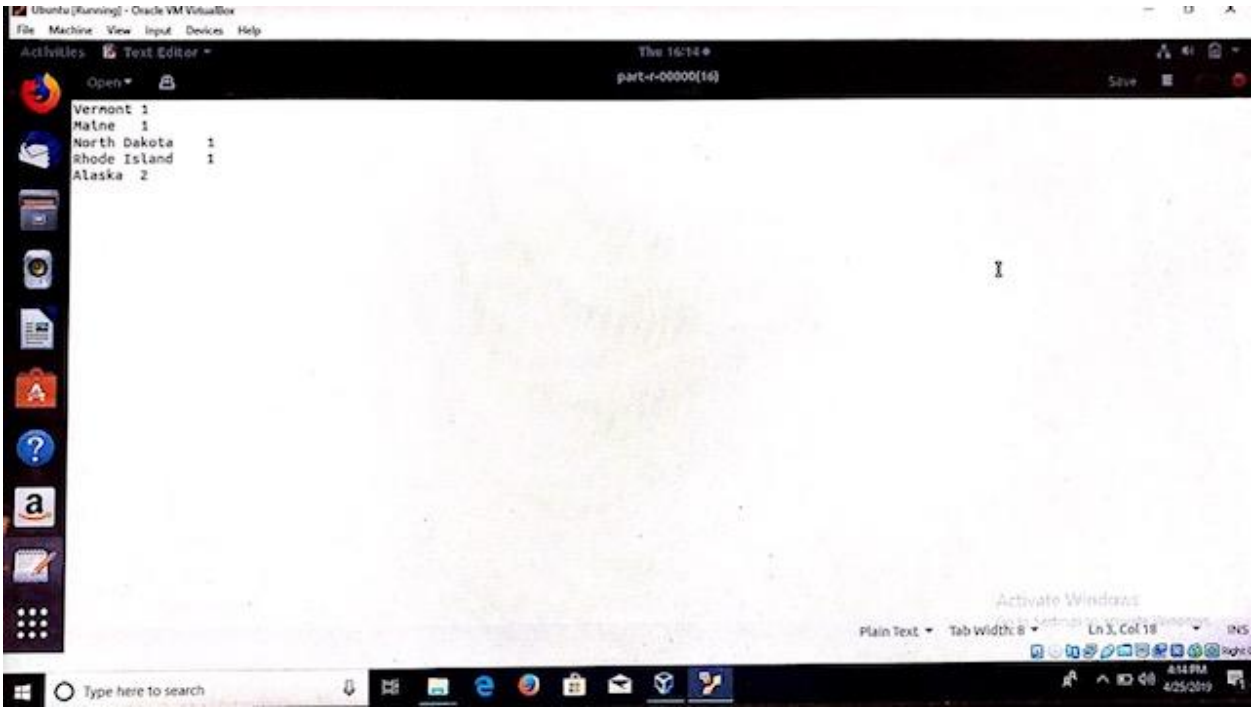
```
1  package com.retail;
2
3
4
5  import java.io.IOException;
16
17 public class LowestStateReducer
18         extends Reducer<Text, IntWritable, Text, IntWritable>{
19     int total;
20     Map<String,Integer> allcitiesMap = new HashMap<String,Integer>();
21     MyValueComparator bvc =  new MyValueComparator(allcitiesMap);
22     TreeMap<String,Integer> sorted_map = new TreeMap<String,Integer>(bvc);
23
24
25     @Override
26     protected void reduce(Text key, Iterable<IntWritable> values,
27             Context context)
28             throws IOException, InterruptedException {
29         int sum = 0;
30         for(IntWritable val:values){
31             sum =sum+val.get();
32         }
33         allcitiesMap.put(key.toString(), sum);
34
35     }
36
37
38     @Override
       protected void cleanup(Context context){
```



```
36
37
38     @Override
39     protected void cleanup(Context context){
40         sorted_map.putAll(allcitiesMap);
41         System.out.println("allcitiesMap :: "+allcitiesMap);
42         Set<String> keyset = sorted_map.descendingKeySet();
43         System.out.println("sorted_map :: "+sorted_map);
44         System.out.println("keyset ::: "+keyset);
45
46         int count =0;
47         try {
48             for(String cityName : keyset){
49                 System.out.println("cityName ::: "+cityName);
50                 System.out.println("value :::: "+sorted_map.get(cityName));
51                 count++;
52                 context.write(new Text(cityName), new IntWritable(allcitiesMap.get(cityName)));
53                 if(count==3){
54                     break;
55                 }
56             }
57         } catch (IOException | InterruptedException e) {
58             // TODO Auto-generated catch block
59             e.printStackTrace();
60         }
61
62     }
63
```

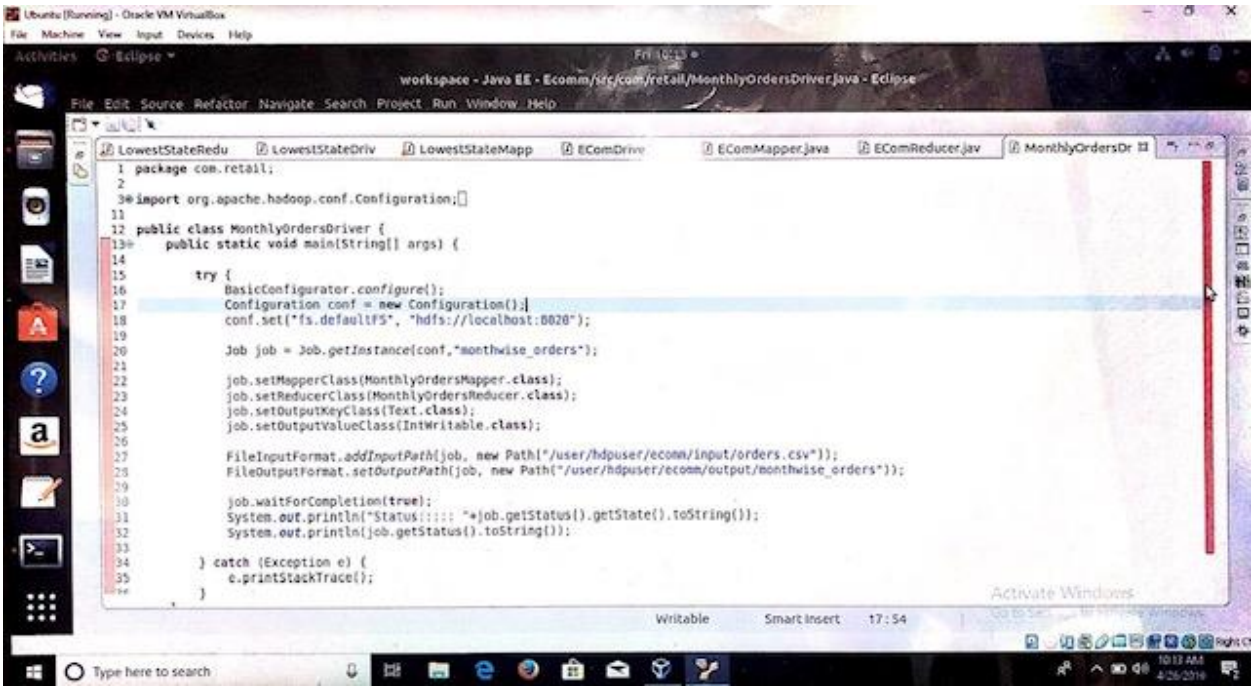

workspace - Java EE - Ecomm/src/com/retail/LowestStateReducer.java - Eclipse
StrTest.java
LowestStateRedu
LowestStateDriv
EComDrive.java
EComMapper.java
EComReducer.jav
if(count==5){
break;
}
}
} catch (IOException | InterruptedException e) {
// TODO Auto-generated catch block
e.printStackTrace();
}
}
}
class MyValueComparator implements Comparator<String> {
Map<String, Integer> base;
public MyValueComparator(Map<String, Integer> base) {
this.base = base;
}
public int compare(String a, String b) {
if (base.get(a) >= base.get(b)) {
return -1;
} else {
return 1;
}
}
}
Writable
Smart Insert
58 : 47
Type here to search

OUTPUT

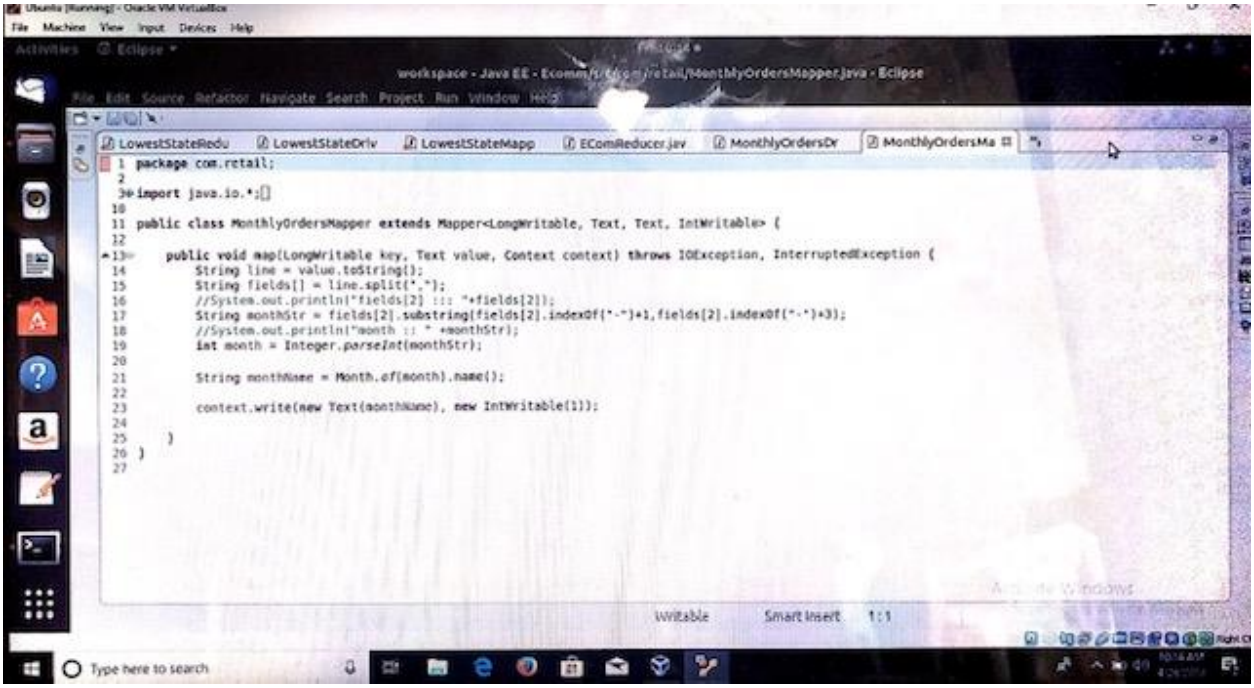

part-r-00000(16)
Vermont 1
Maine 1
North Dakota 1
Rhode Island 1
Alaska 2
Plain Text
Tab Width: 8
Ln 1, Col 18
INS
Type here to search

MONTHLY ORDERS

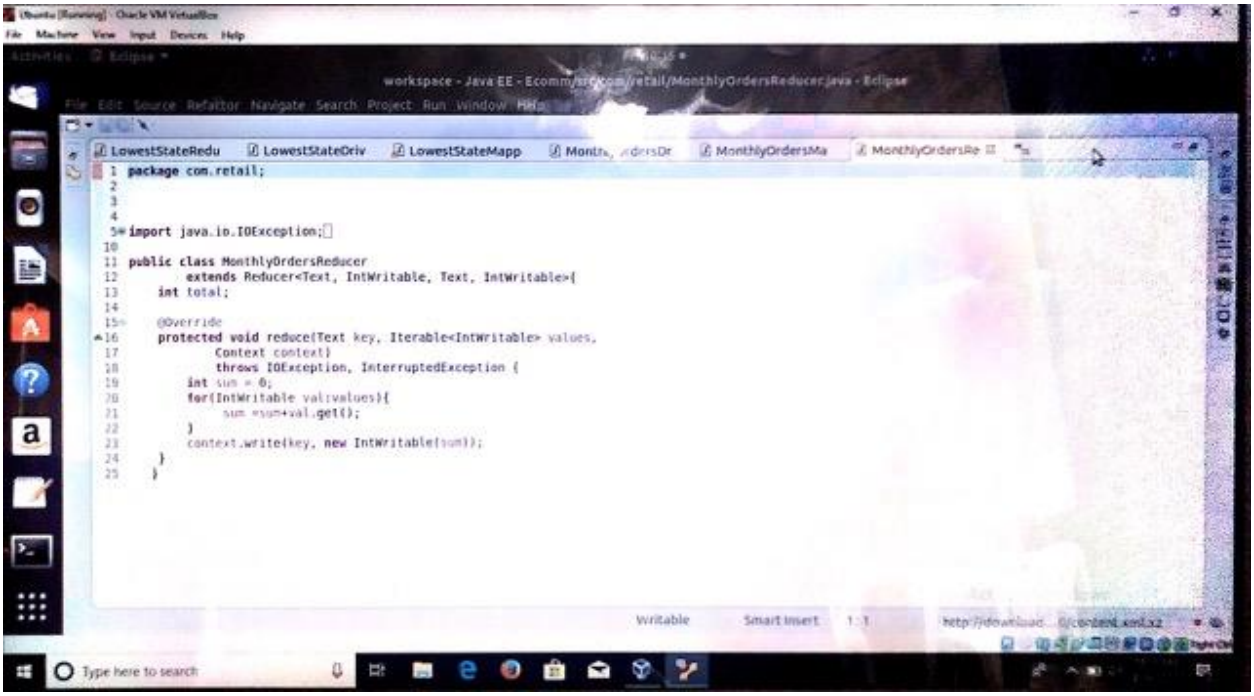
- DRIVER CLASS



- MAPPER CLASS

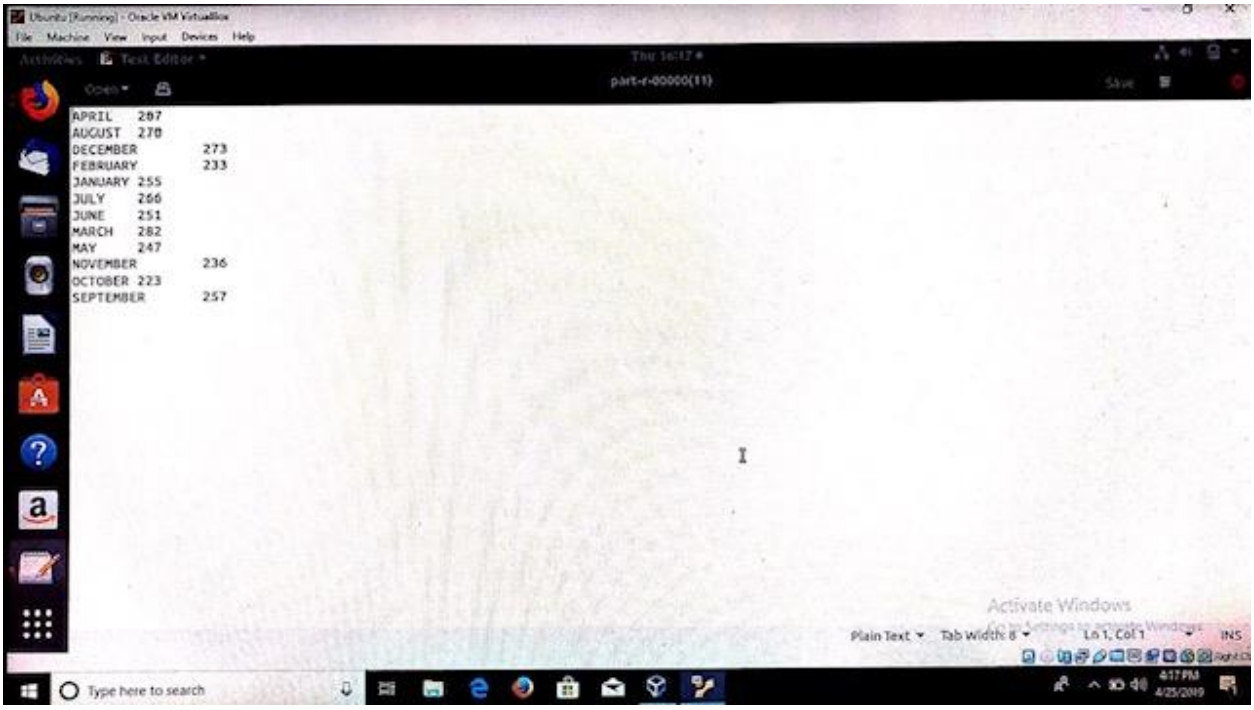


- REDUCER CLASS



```
package com.retail;


import java.io.IOException;

public class MonthlyOrdersReducer
        extends Reducer<Text, IntWritable, Text, IntWritable>{
    int total;

    @Override
    protected void reduce(Text key, Iterable<IntWritable> values,
            Context context)
            throws IOException, InterruptedException {
        int sum = 0;
        for(IntWritable val:values){
            sum =sum+val.get();
        }
        context.write(key, new IntWritable(sum));
    }
}
```

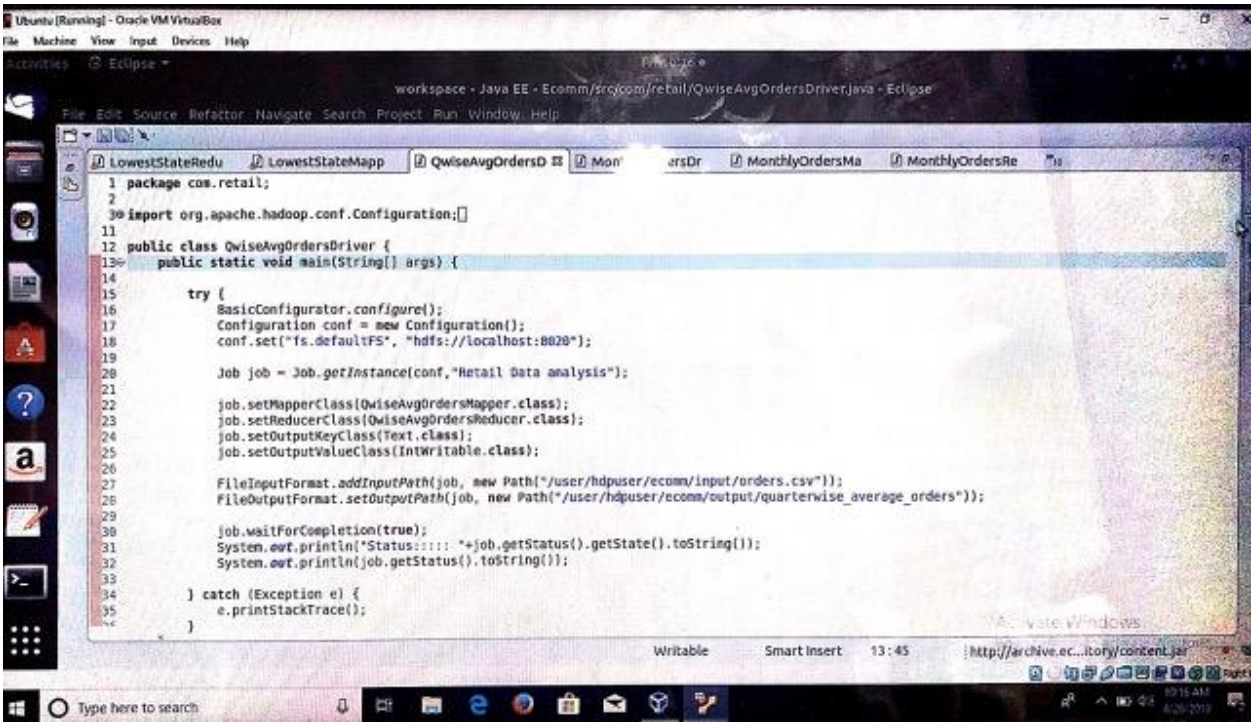
OUTPUT



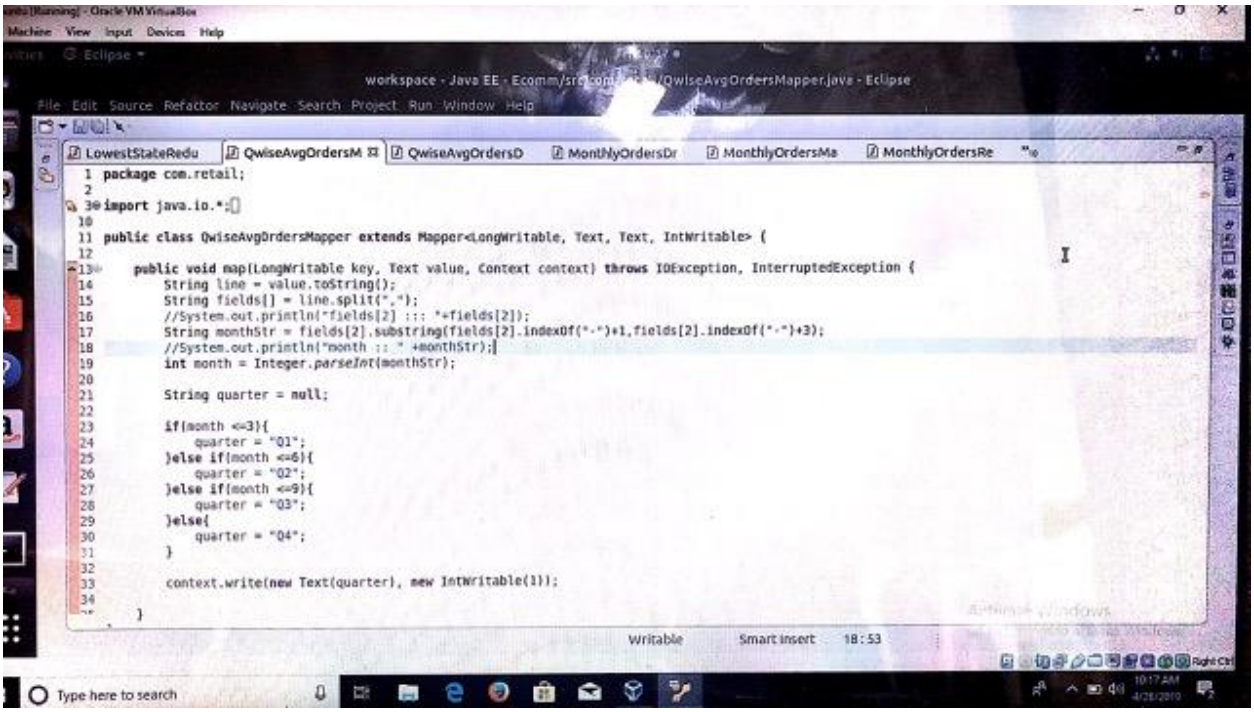
```
APRIL   207
AUGUST  270
DECEMBER        273
FEBRUARY        233
JANUARY 255
JULY    266
JUNE    251
MARCH   282
MAY     247
NOVEMBER        236
OCTOBER 223
SEPTEMBER       257
```

QUARTER WISE AVERAGE SALES

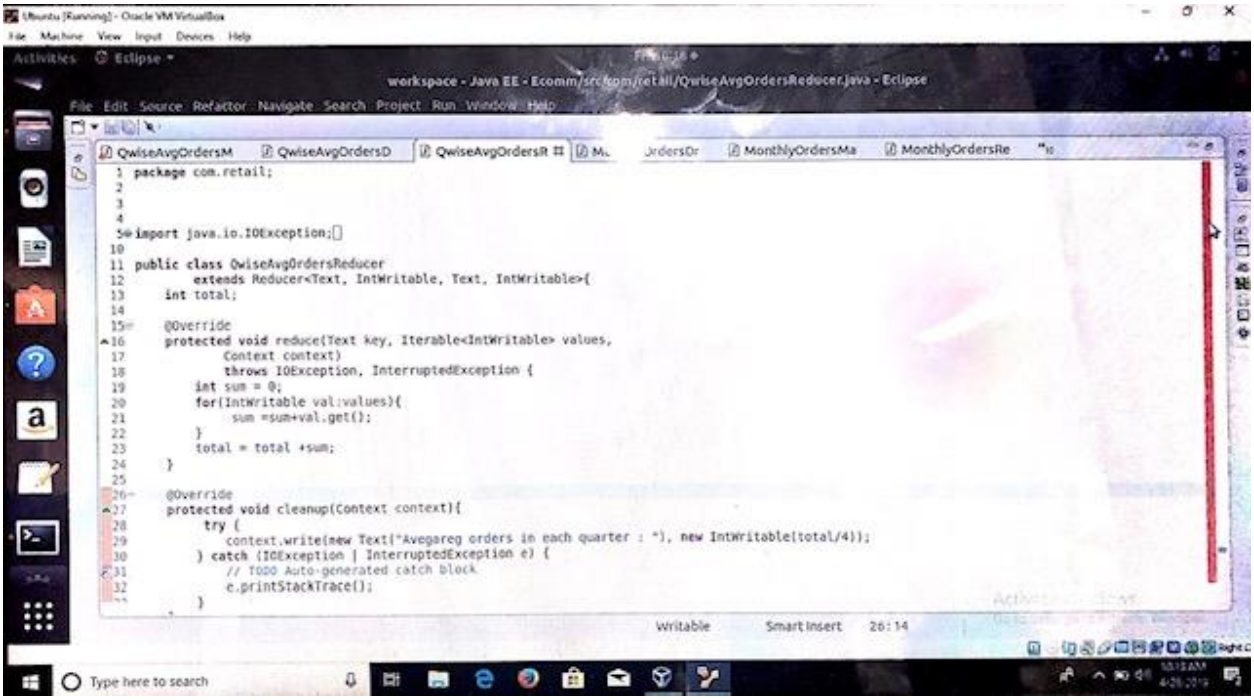
- DRIVER CLASS



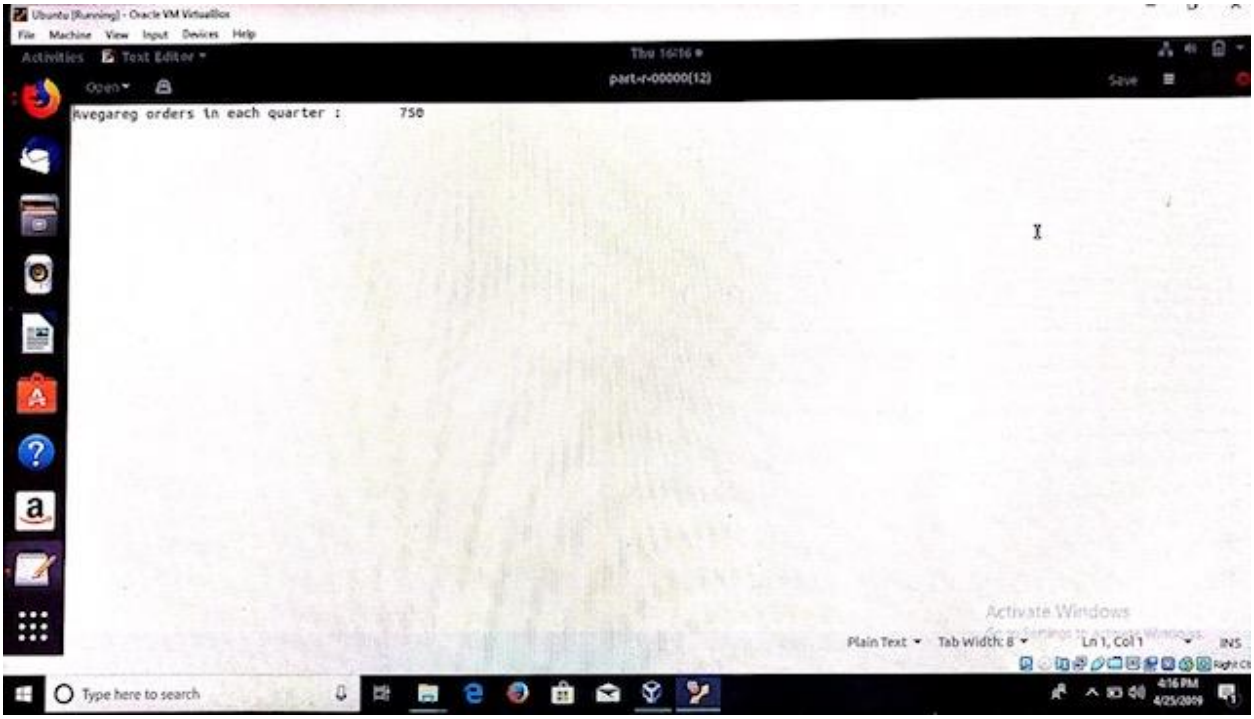
- MAPPER CLASS



- REDUCER CLASS

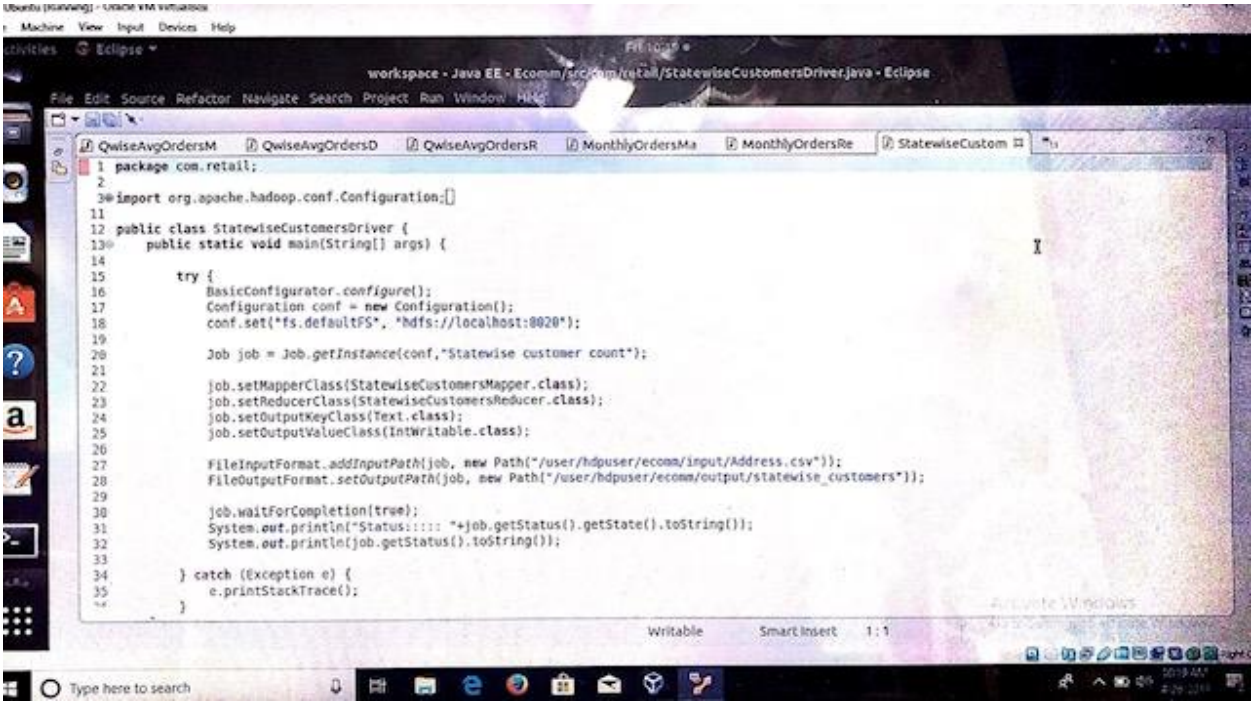


OUTPUT

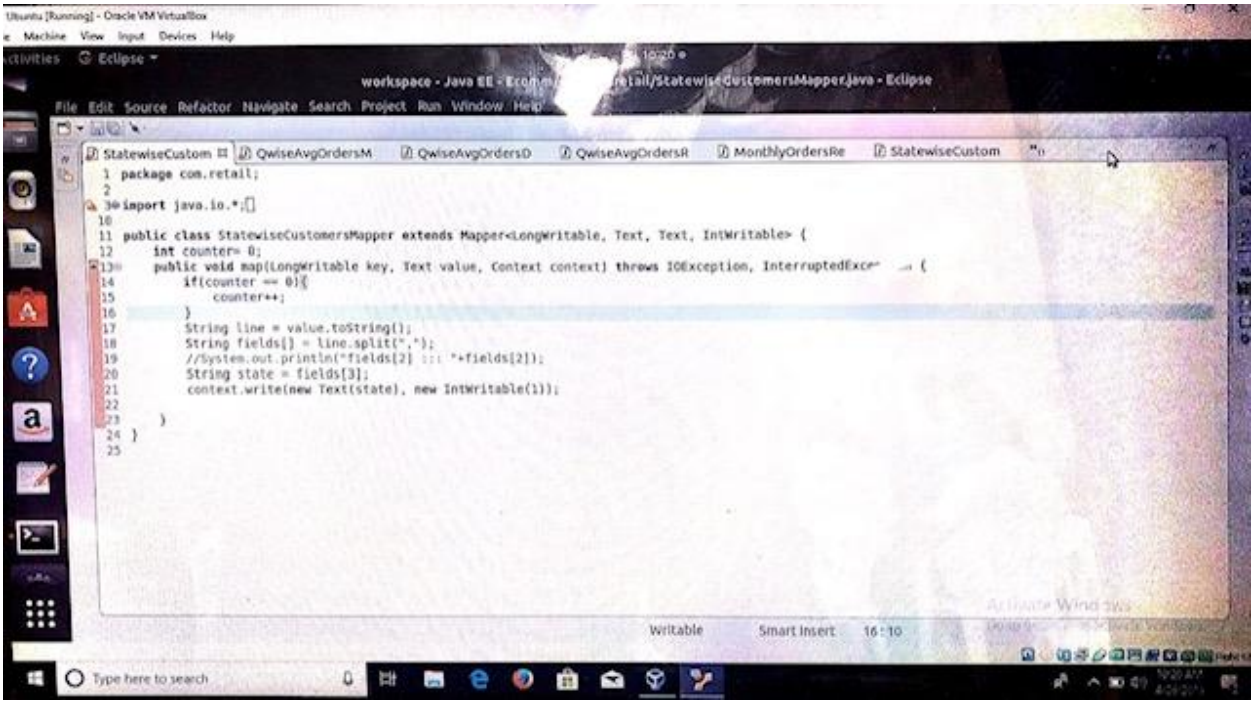


STATEWISE CUSTOMERS

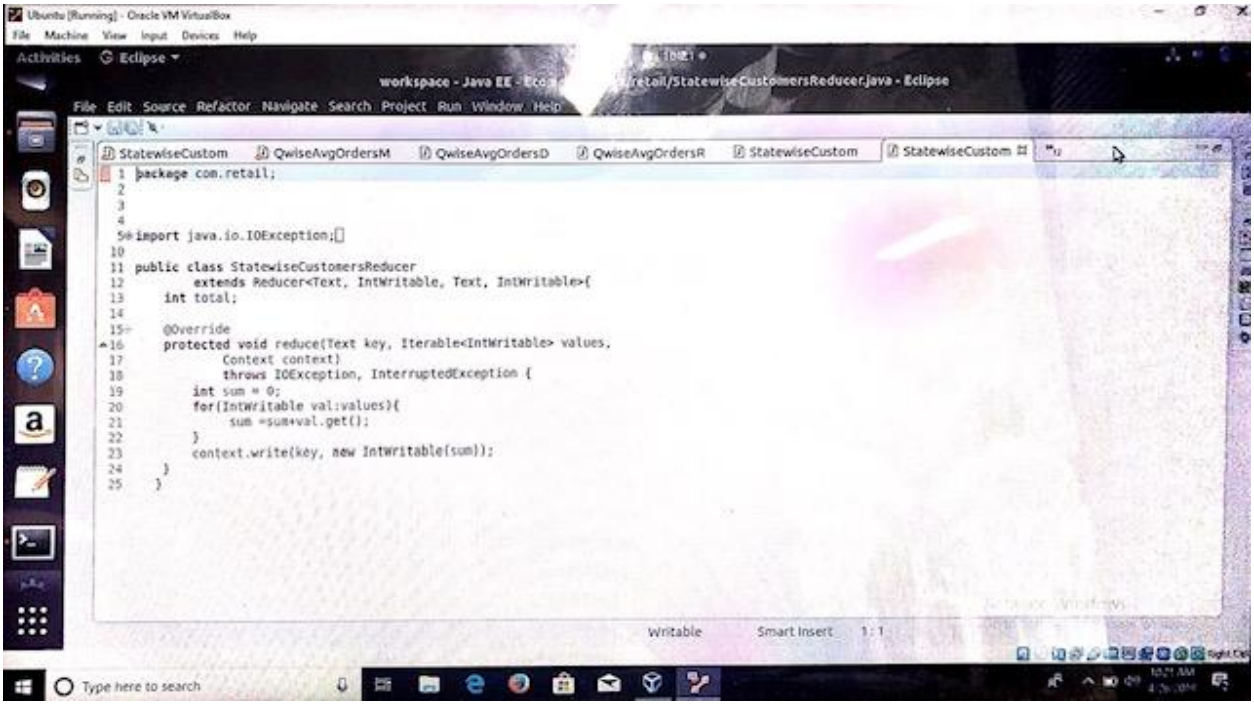
- DRIVER CLASS



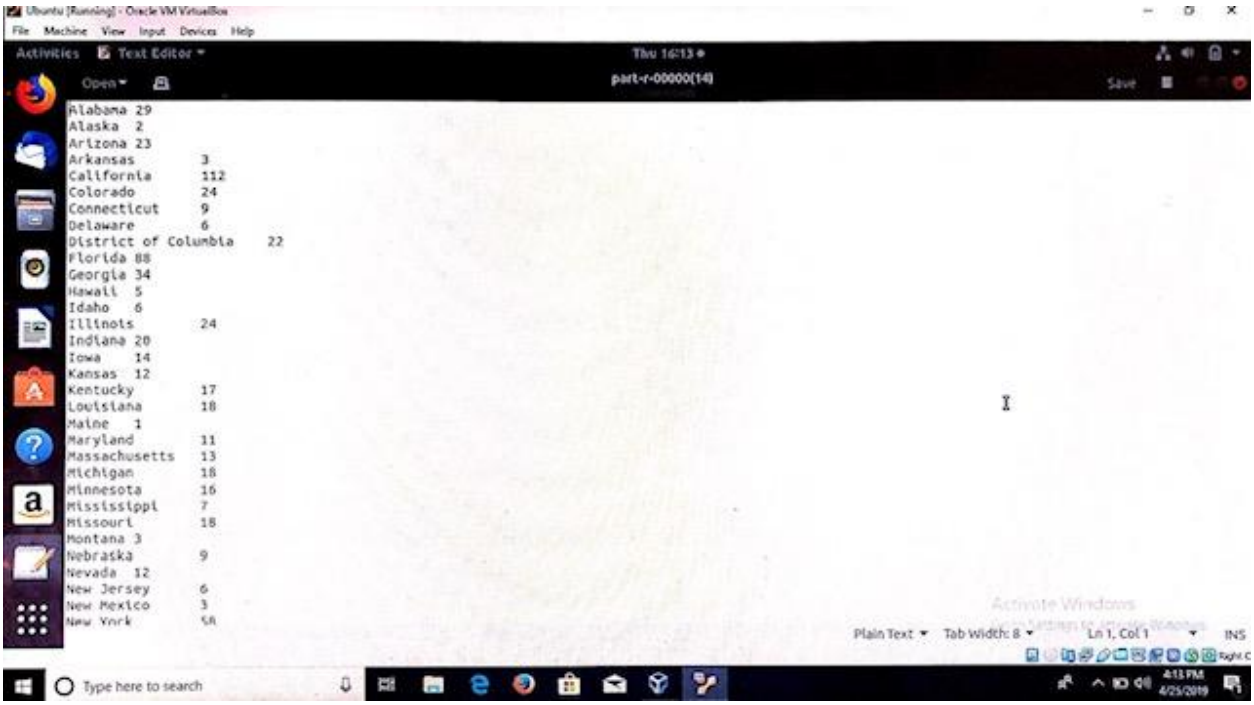
- MAPPER CLASS

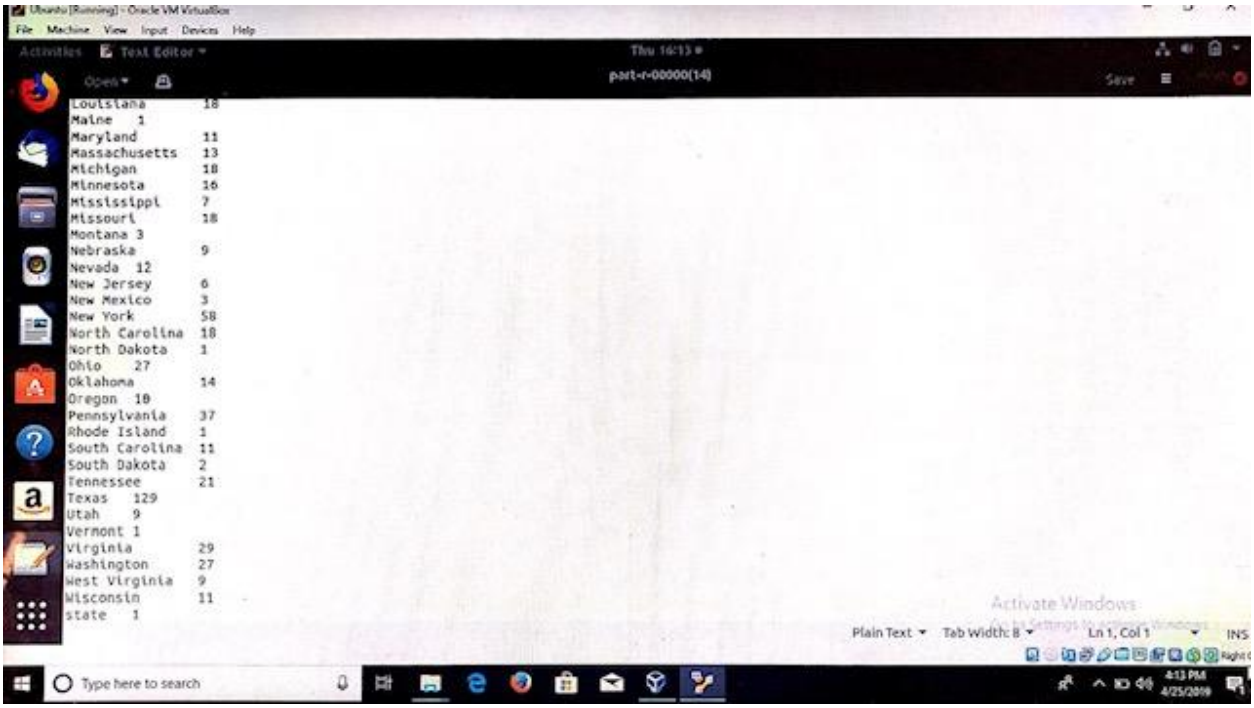


- REDUCER CLASS



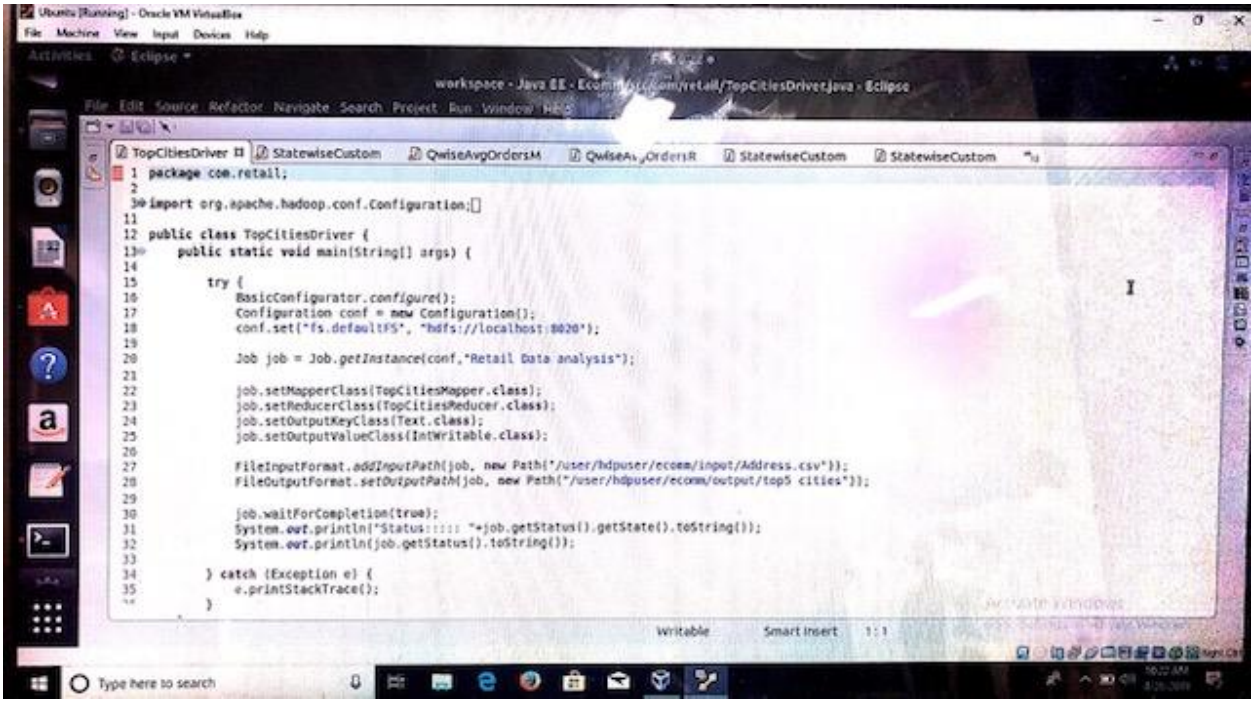
OUTPUT



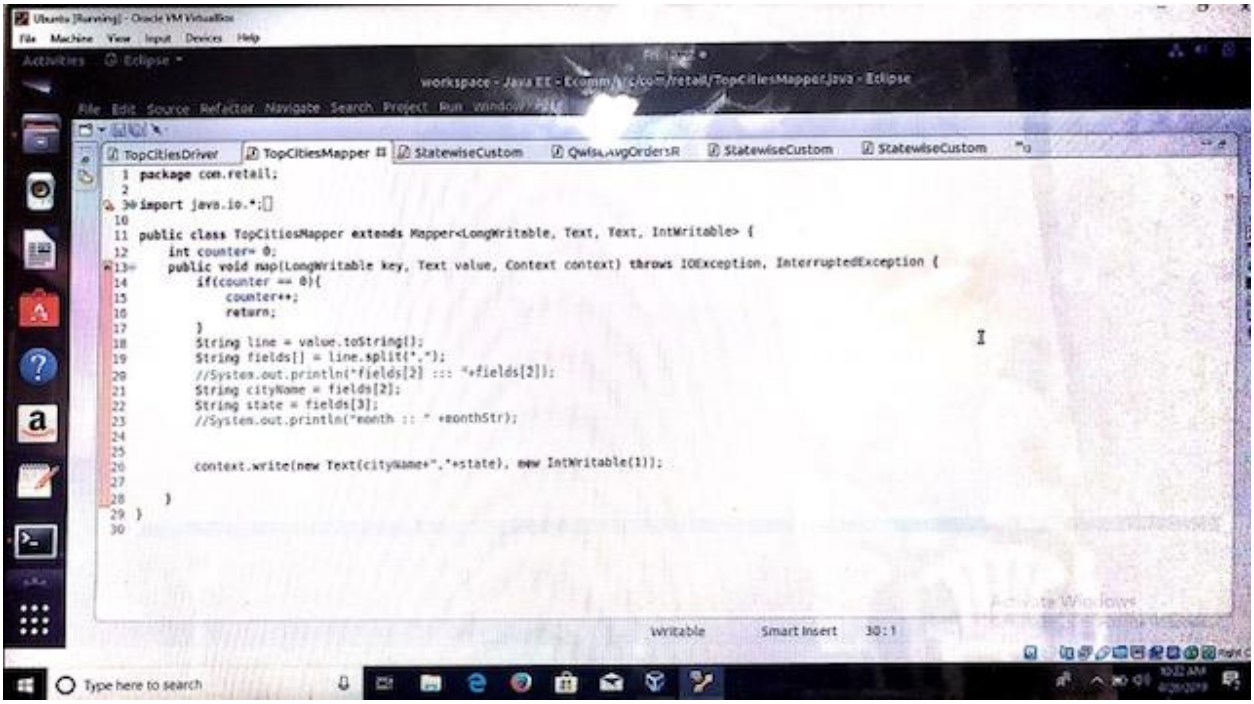


TOP CITIES

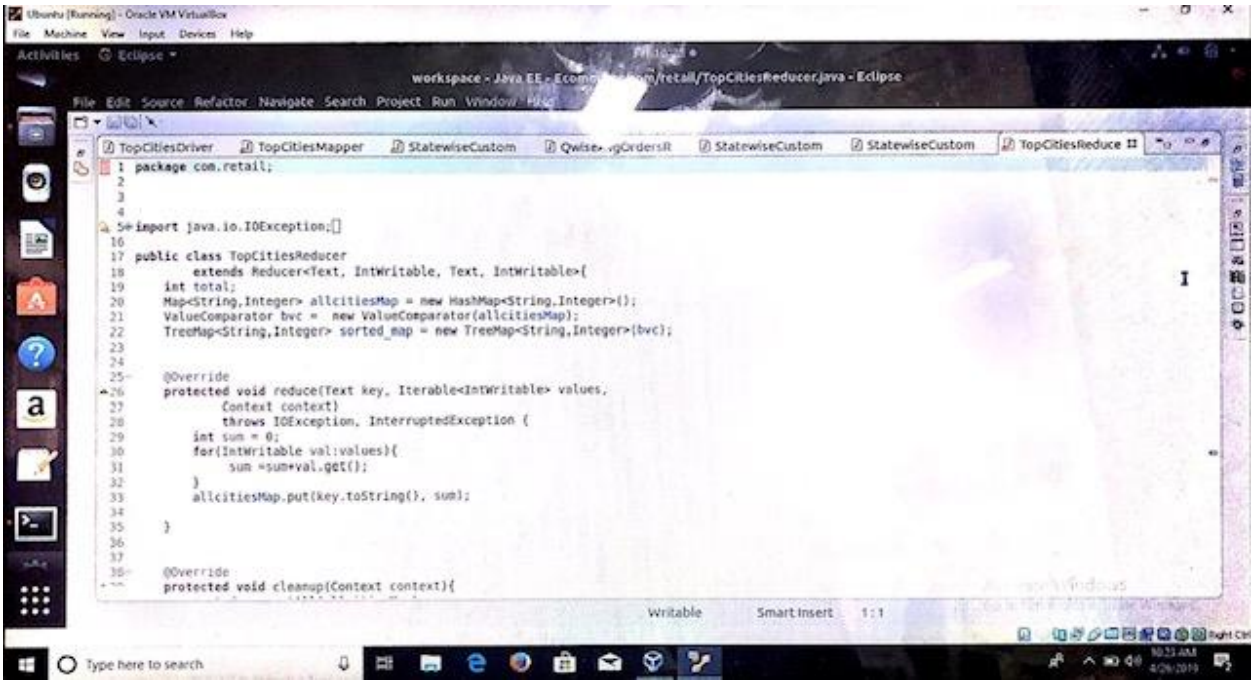
- DRIVER CLASS

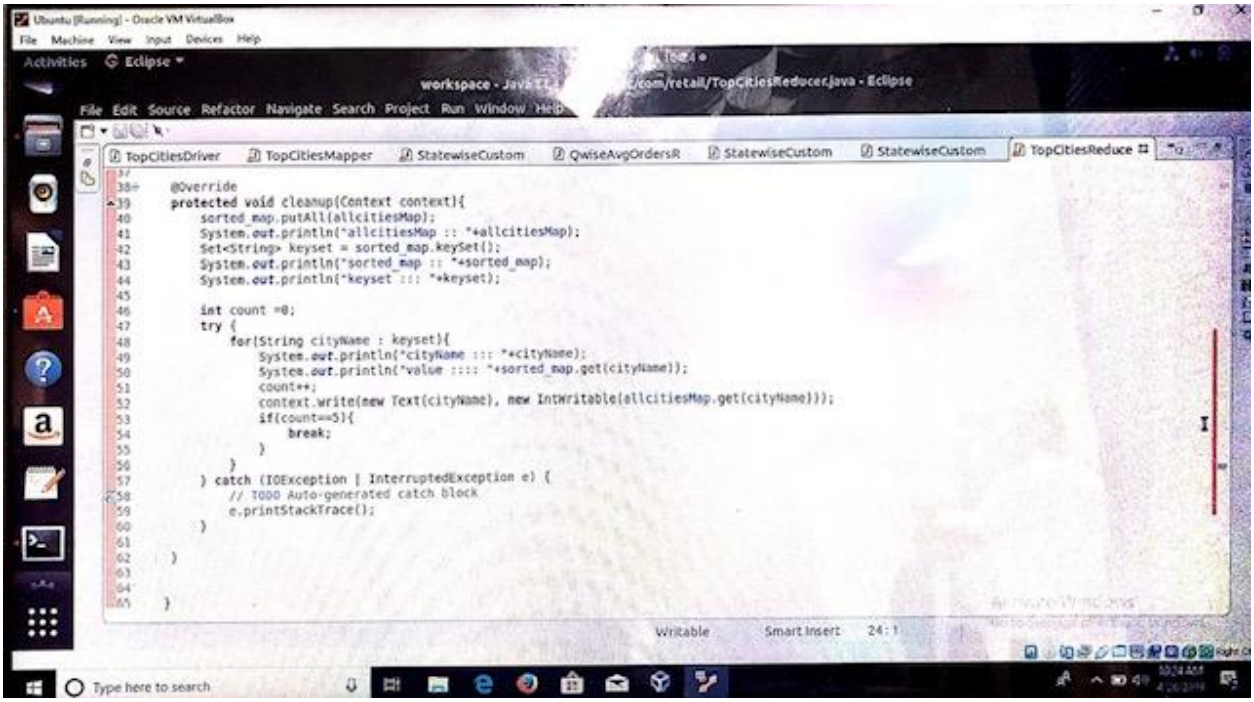


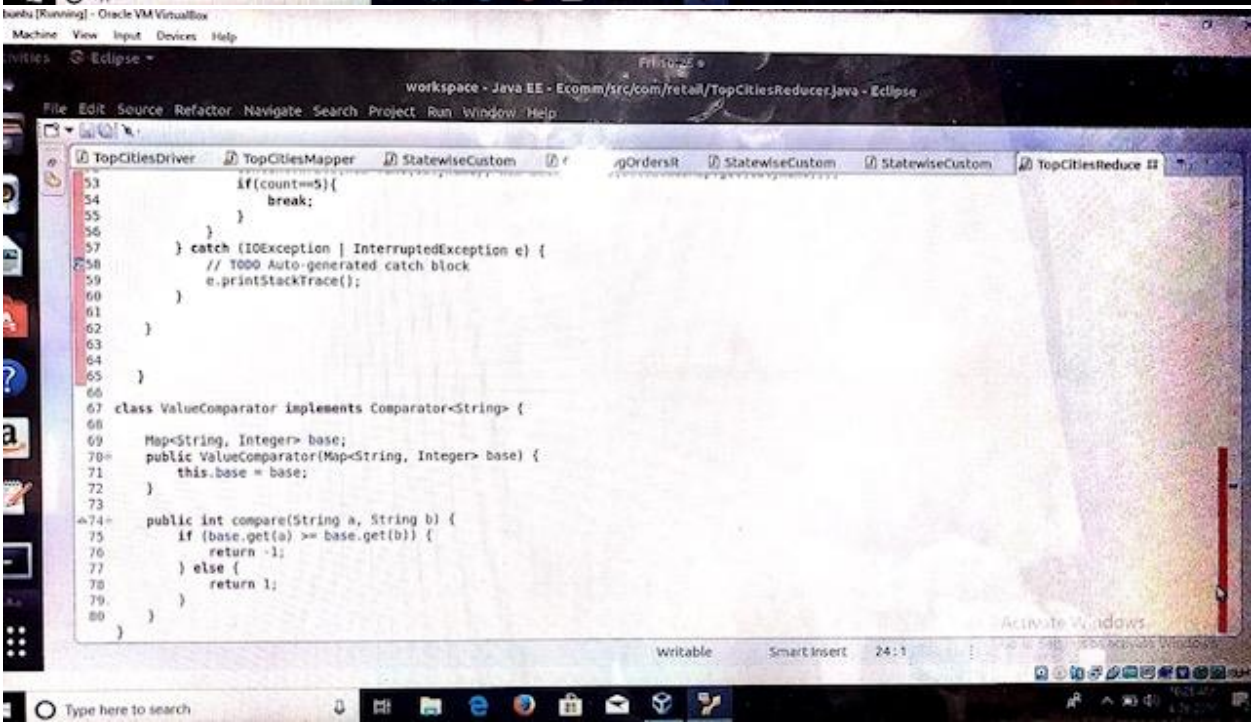
- MAPPER CLASS



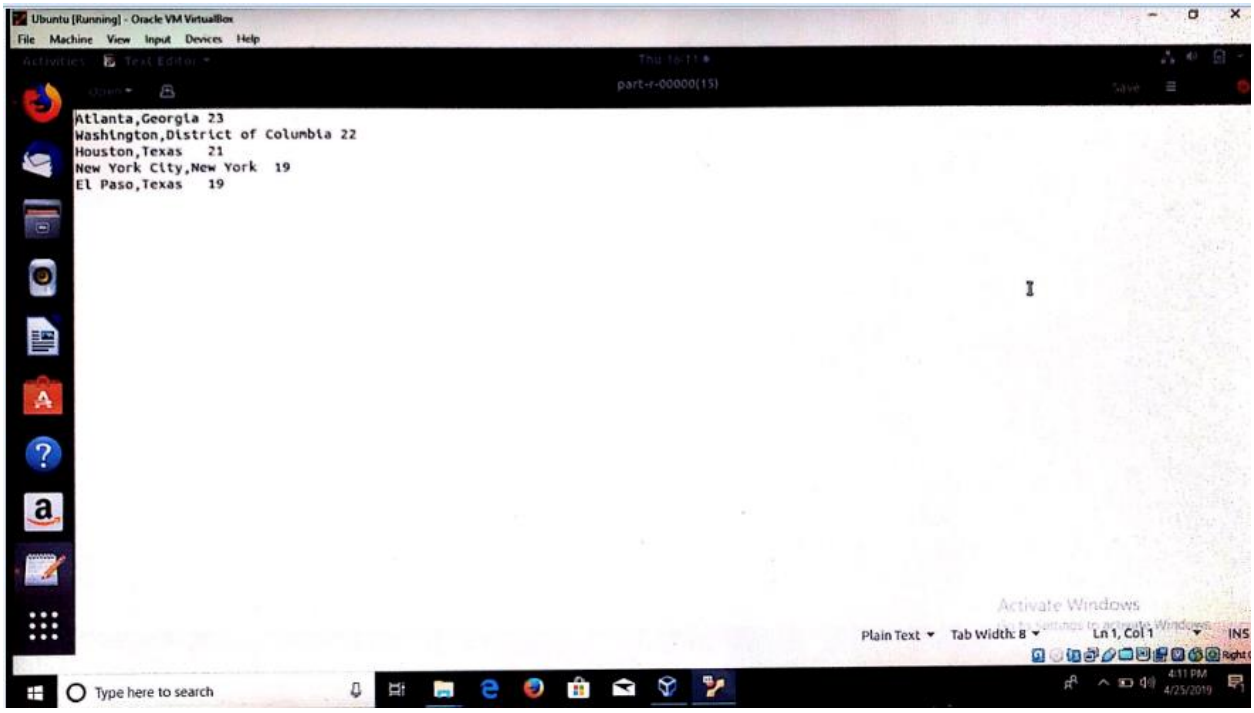
- REDUCER CLASS




Ubuntu [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities Eclipse
workspace - Java EE - Ecomm/src/com/retail/TopCitiesReducer.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
TopCitiesDriver
TopCitiesMapper
StatewiseCustom
QwiseAvgOrdersR
StatewiseCustom
StatewiseCustom
TopCitiesReduce
@Override
protected void cleanup(Context context){
sorted_map.putAll(allcitiesMap);
System.out.println("allcitiesMap :: "+allcitiesMap);
Set<String> keyset = sorted_map.keySet();
System.out.println("sorted_map :: "+sorted_map);
System.out.println("keyset ::: "+keyset);
int count =0;
try {
for(String cityName : keyset){
System.out.println("cityName ::: "+cityName);
System.out.println("value :::: "+sorted_map.get(cityName));
count++;
context.write(new Text(cityName), new IntWritable(allcitiesMap.get(cityName)));
if(count==5){
break;
}
}
} catch (IOException | InterruptedException e) {
// TODO Auto-generated catch block
e.printStackTrace();
}
}
}
Writable
Smart Insert
24 : 1
Type here to search


Ubuntu [Running] - Oracle VM VirtualBox
Machine View Input Devices Help
Eclipse
workspace - Java EE - Ecomm/src/com/retail/TopCitiesReducer.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help
TopCitiesDriver
TopCitiesMapper
StatewiseCustom
StatewiseCustom
StatewiseCustom
TopCitiesReduce
if(count==5){
break;
}
}
} catch (IOException | InterruptedException e) {
// TODO Auto-generated catch block
e.printStackTrace();
}
}
}
class ValueComparator implements Comparator<String> {
Map<String, Integer> base;
public ValueComparator(Map<String, Integer> base) {
this.base = base;
}
public int compare(String a, String b) {
if (base.get(a) >= base.get(b)) {
return -1;
} else {
return 1;
}
}
}
Writable
Smart Insert
24 : 1
Type here to search

OUTPUT



6. SYSTEM TESTING

The reason for testing is to find mistakes. Testing is the way toward endeavoring to find each possible issue or shortcoming in a work item. It gives an approach to check the usefulness of parts, sub-congregations, gatherings or potentially a completed item It is the way toward practicing programming with the plan of guaranteeing that the Software framework lives up to its necessities and client desires and does not bomb in an unsatisfactory way. There are different kinds of test. Each test type tends to a particular testing prerequisite.

6.1. TYPES OF TESTING

6.1.1. UNIT TESTING

Unit testing includes the plan of experiments that approve that the inward program rationale is working appropriately, and that program inputs produce legitimate yields. All choice branches and inner code stream ought to be approved. It is the trying of individual programming units of the application .it is done after the fruition of an individual unit before combination. This is a basic testing, that depends on information of its development and is obtrusive. Unit tests perform essential tests at segment level and test a particular business procedure, application, or potentially framework setup. Unit tests guarantee that every one of a kind way of a business procedure performs precisely to the archived details and contains unmistakably characterized sources of info and anticipated outcomes.

6.1.2. BLACK BOX TESTING

Black Box Testing will be trying the product with no information of the inward activities, structure or language of the module being tried. Discovery tests, as most different sorts of tests, must be composed from an authoritative source record, for example, detail or necessities report, for example, particular or prerequisites archive. It is a trying in which the product under test is dealt with, as a discovery .you can't "see" into it. The test gives data sources and reacts to yields without thinking about how the product functions.

6.1.3. WHITE BOX TESTING

White Box Testing is a trying in which in which the product analyzer knows about the inward operations, structure and language of the product, or if nothing else its motivation. It is reason. It is utilized to test territories that can't be come to from a discovery level.

6.1.4. TEST STRATEGY AND APPROACH

Field testing will be performed manually and functional tests will be written in detail.

6.2. TEST OBJECTIVES

- All field sections must work appropriately.
- Pages must be initiated from the recognized connection.
- The passage screen, messages and reactions must not be deferred.

6.3. FEATURES TO BE TESTED

- Verify that the passages are of the right configuration
- No copy passages ought to be permitted
- All connections should take the client to the right page.

6.3.1. INTEGRATION TESTING

Integration tests are intended to test coordinated programming segments to decide whether they really keep running as one program. Testing is occasion driven and is progressively worried about the fundamental result of screens or fields. Joining tests exhibit that despite the fact that the parts were independently fulfillment, as appeared by effectively unit testing, the mix of segments is right and steady. Coordination testing is explicitly gone for uncovering the issues that emerge from the mix of parts.

6.3.2. FUNCTIONAL TESTING

Practical tests give deliberate showings that capacities tried are accessible as determined by the business and specialized prerequisites, framework documentation, and client manuals.

Practical testing is focused on the accompanying things:
Legitimate Input : recognized classes of substantial information must be acknowledged.
Invalid Input : distinguished classes of invalid info must be rejected.
Capacities : distinguished capacities must be worked out.
Yield : distinguished classes of use yields must be worked out.

Frameworks/Procedures : interfacing frameworks or techniques must be summoned.

Association and arrangement of practical tests is centered around prerequisites, key capacities, or unique experiments. What's more, orderly inclusion relating to recognize Business process streams; information fields, predefined forms, and progressive procedures must be considered for testing. Before practical testing is finished, extra tests are recognized and the successful estimation of current tests is resolved.

6.3.3. SYSTEM TESTING

System testing guarantees that the whole incorporated programming framework meets prerequisites. It tests a design to guarantee known and unsurprising outcomes. A case of framework testing is the design situated framework incorporation test. Framework testing depends on procedure portrayals and streams, accentuating pre-driven procedure connections and incorporation focuses.

5.4. TESTS CONDUCTED

Tests are led to watch that each hub in the bunch is effectively working or not and the physically some test are led to check the yield esteems.

Test Results

All the test cases mentioned above passed successfully. No defects encountered.

7. CONCLUSION

I found the business bits of knowledge of current online business information. Also, get the advantages for business development. State shrewd check of client from this, we discovered which are the states have most noteworthy number of clients and which have least number of customers.so that, if the clients tally is low, they can do, more advancements in such territories and they can develop their business. City insightful number of requests, from this, we discovered which urban communities have most astounding number of requests and least number of requests. Quarter shrewd deals and the sky is the limit from there.

8. BIBLIOGRAPHY

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