# Implementation of ElasticSearch Search Engine on Order Management System Data

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### ABSTRACT

Elasticsearch is a search engine, generally searching full-text formatted data. It organizes the data and makes them more accessible. Elasticsearch is built with Java programming language, open-source, and under the Apache license. Elasticsearch is utilized technically by querying searched keywords, which communicated via API. It is installed in a standalone database server using HTTP/JSON protocol, retrieved and stored data in optimized form. It becomes a reliable technology in today's IT industries that needs optimization in searching full-text formatted data. The bigger size of data, the slower the accessibility, meantime, recent requirements need faster access for very large transaction. The research discussed the influence of adding Elasticsearch in web-based system and the non-adding Elasticsearch. The study implemented Agile Scrum methodology in developing the system. The result of this study is the data access becomes faster by 10.01% when implemented Elasticsearch.

#### **Keywords**

Elasticsearch; MongoDB; Replica Set; PHP

#### **1. INTRODUCTION**

Some companies have implemented Elasticsearch search engines to improve the performance of their systems. Elasticsearch relates to optimized index storage by Lucene and the actual algorithm for text matching. Elasticsearch is run using Application Programming Interface (API) method which has high scalability. The Elasticsearch installation on the server is quite simple although some configurations need to adjust the environment.

The Order Management System which is the observing object of the Elasticsearch application is a system used by users such as online merchants or wholesalers or merchants. Order Management System that runs at this time has applied NoSQL as their transaction database. In day-to-day operations, the company has not met the satisfaction in the performance of system usage, so it needs to be done from the system that has been running to improve the performance of the system. Based on the above conditions, then conducted a study titled "Implementation Elasticsearch Search Engine on Order Management System". With this implementation, it is expected to facilitate the company in conducting activities related to user order management.

#### 2. LITERATURE VIEW

In this section, we give some reviews on Elasticsearch experiment to compare the system's performance of some NoSQL and SQL databases on a single machine, and conceptual working of Elasticsearch.

Presented benchmarking an experimental evaluation of the four NoSQL Systems using various workloads, they are

ElasticSearch, MongoDB, Redis and OrientDB. By using Yahoo Cloud Serving Benchmark (YCSB), they vary the parameters that affect the performance of the databases execution time. Their work do not consider the implementation of Elasticsearch in real industrial system (Abubakar, Adeyi, & Auta, 2014).

Presented theory and working of Elasticsearch. They also presented benefits of Amazon Elasticsearch service. Their work is limited to conceptual working of Elasticsearch only (Gupta & Nair, 2016).

Search engines are a practical application of information retrieval techniques to large-scale text collections. Web search engines, such as Google and Yahoo!, must be able to capture a number of terabytes of data, and then provide sub-second response times to the millions of queries that are sent daily from around the world.

Open source search engines are another important system class that has somewhat different design goals than commercial search engines. The three systems of interest are Lucene, Lemur, and Galago. Lucene is a popular Java-based search engine and has been used for a variety of commercial applications (Croft, Metzler, & Strohman, 2015). Elasticsearch is an open-source search engine built on Apache Lucene <sup>TM</sup>, a full-text search engine library. Lucene can be said to be the latest, high performing, full-featured, and full-featured search engine library (Gormley & Tong, 2015). Some of the concepts that come with Elasticsearch that can help a full understanding of how elasticsearch works can be described as follows (Gupta & Nair, 2016):

1. Index

Elasticsearch uses the library's Apache Lucene library to write and read data from the index. The elasticsearch index may be built on more than one Apache Lucene index using "Shards".

2. Documents

Document is the main entity in the world of elasticsearch. The document consists of fields, and each field is identified by its name and may contain one or more values.

3. Type

Each document in Elasticsearch has a defined type. It is possible to store different types of documents in one index and different mappings for different document types.

4. Mapping

All documents are analyzed before being indexed. Text input is divided into tokens, which tokens should be filtered out, or what additional processes, such as deleting HTML tags, are needed. This is where the mapping stage begins to play; it holds all the information about the chain of analysis.

A way to improve the performance performed on Elasticsearch is to do the data denormalization in the index. By having a copy of the data in each document, it can reduce the need for a join among indexes. The advantage of data denormalization is speed. This is because each document contains all the necessary information in determining whether the data found matches what is searched in query form so there is no need for a complex join index (Gormley & Tong, 2015).

#### **3. OBJECTIVE**

The aim of this study is to improve the processing performance and appearance of data on the system. Besides, to keep the maintainability of data on the system to easily adapt to system changes.

# 4. RESEARCH METHODOLOGY4.1 Data Collection Technique

Methods of data collection conducted in this study is by observation (direct observation in the environment of Information Technology division and Operational division), interviews (conducting question and answer with staff on related division), and literature study (data collection through books, e-books and journals related with research).

#### 4.2 System Development Method

The method used to build this system is the Agile Scrum Model. This model is an approach to systematic software development, with several steps, namely: Planning, Design, Coding, and Testing.

## 5. ANALYSIS

#### 5.1 Current System Analysis

The running business process system can be explained as follows:

- 1. The customer wraps the item want to send.
- 2. The customer enters the information of the goods to be sent in one Excel file and sends it by e-mail to the Agent.
- 3. Agent receives email and inserts item information from Excel file into system.
- 4. Driver picks up goods from customer and will update the status of goods through mobile apps provided.
- 5. Items are then delivered to the Shipper warehouse.
- 6. Agent will check-in goods delivered into the system and sort by logistics type. Goods are divided into 2 batches (day and night).
- 7. Once the item has been sorted, Agent will checkout the goods.
- 8. Driver will deliver the goods that have been batched with AWB list to the logistics.
- 9. The logistics party will register the goods into their system and receive the AWB number.
- 10. Agent will update order tracking status of goods.

#### **5.2 Target System Analysis**

Based on the analysis on the system running, then the system development on order management will be built with the following specifications:

- 1. Agent required to login first before making new order, see order until update order status.
- 2. To create a new order, the agent must fill all the necessary data into the system before making the process of taking

the goods.

- 3. Agent will also update the status of order and airwaybill number (awb) into the system when knowing the change of order delivery status and also when it has received airwaybill number.
- 4. Agent is also able to see the entire order data that goes online through the system.
- 5. On the system will be implemented Elasticsearch search engine to improve performance in online data order search through the system.

#### 5.3 User System Analysis

Users who will be involved in the system as well as its role in the system is <u>Agent</u>: User who has the task to create order, view order, checkin order, checkout order, and input AWB number.

#### 5.4 Database Design

The database design of the system can be seen in the following table.

#	Tables Name on Database
1	Agent
2	Backend_users
3	Role
4	City
5	Drivers
6	Logistic
7	Province
8	Order_tracking
9	Order
10	Rate
11	Rateshow
12	Track_status
13	Address
14	Users
15	Logistic_status
16	Suburb
17	Area
18	Route
19	Pricing

#### Table 1. List of Table on Database

# 6. RESULT ON TESTING

#### 6.1 Implementation Environment

In the implementation of elasticsearch on the order management system, hardware and software are required, in which hardware specifications can be explained as follows:

- 1. Processor Intel Core i3
- 2. RAM 4GB
- 3. Harddisk 500GB

While the software specifications used are as follows:

- 1. Operating system Windows 10
- 2. System development tools Microsoft Visual Studio Code.
- 3. The programming language PHP CI.
- 4. The database application program My SQL and MongoDB
- 5. Web browser Google Chrome.

#### 6.2 Sprint 1

Here are sprint backlogs, system interfaces, and burndown chart results in Sprint 1.

Backlog Item	Story Points (1 point = 2 hours)	Original Estimate (in hour)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Sprint Review and Retrospective
User Story #1	4												
Login	3	6	2	0	0	0	0	0	0	0	0	0	0
Home	1	2	2	0	0	0	0	0	0	0	0	0	0
User Story #2	7				1	1							
Select Agent	2	4	2	2	0	0	0	0	0	0	0	0	0
Create Order	5	10	10	10	9	4	1	0	0	0	0	0	0
User Story #3	5												
Order List	3	6	6	6	6	6	6	3	0	0	0	0	0
Order Detail	2	4	4	4	4	4	4	4	2	0	0	0	0
Total	16	32	28	22	19	14	11	7	2	0	0	0	0

#### Fig 1: Sprint Backlog

#### Shipper.id

#### Sign in to start your session

User name Password

Signin

Activate Windows Go to Settings to activate Windov

Fig 2: Login View

Shipper.id	=	Sign out
Hotelmet	Dashboard Control panel	& Home > Dashboard
# Orders <	Welcome to Shipper HQ! The time is : 08 Jul 2017 15:11:58 Create Order Add AWB Number Todal Order Active : 0 Todal Order Active : 0 Todal Order New : 0 Todal Order Pick Up : 0 Todal Order On Transfer : 0 Todal Order On Transfer : 0 Todal Order Cancelled : 0 Todal Order Delivery : 0 Todal Order Troubled : 0 Todal Order Troubled : 0	
		Activate Windows Go to Settings to activate Windows.
		-

# Fig 3 : Home View

Shipper.id			Sign out
Hi, Agant IAl TH Lekarte	Assign Order to Age	ent	
e Orders 🧠	Select Agent to Assign O	rder To	
	Show 100 - entries		Search
	Agent	Contact	Address
	Jakarta Barat		
	TM Jakarta	De'ns-061280476415	Jelambar123
	Jakarta Pusat		
	TM Jakarta	De'ns-061280476415	Monas
	Jakarta Utara		
	TM Jakarta	De'ns-061280476415	Sunter Testing Sunter Testing1
	Showing 1 to 3 of 3 e	ntries	Previous 1 Next
			Activate Windows Ge to Settings to activate Windows

Fig 4 : Select Agent view

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Shipperid	=	Sign out
Hi, Agent 1Ai TM Jakarta	Orders	# Home > Orders > Create Order
e Orders	Create Order	
	Destination Destination Area Type any destinition - City -	Package Package Dimension (in cm) 50 20 10 Weight (in Kg) 1 Item Value
	Suburb	50000
	Area PostCode Type any postcode here	Item Type Tas Include Insurance Package Type Document Small Medium
	Rates Shipping Cost Get Rates Type the insurance Rate	Logistic Selected logistic Selected Service
	Sender Full Name Type name here Phone Type phone number here	Receiver Full Name Type name here Phone Type phone number here
	Destination Area Address 1 Please type the detail destination address #1 //	Payment Driver (Optional)
	Address 2	Create Create & Continue Cancel
	Please type the detail destination address #2	Create & Continue Cancel
	Address 3	
	Please type the detail destination address #3	
	Check on Google Map	

Fig 5 : Create Order View

Shipper.id		≡						Sign o
		Order Lis	st					
# Orders	<	Order List						
		Create Show 50						Search:
		12	Order IC	) Latest Status	i Origin City II	Dest City	f Counter Name If	Date
		-	1A03034	Order diterima	JakartaBarat	Nanado	Sicepat	Juli 8, 2017, 1:27 pm
		+ I	1A03063	Order ditorima	Jakarta Barat	Ivanado	Siccpat	Juli 8, 2017, 3:27 pm
		•	1402067	Order ditorima	Jakarta Barat	Nanado	ficspat	Juli 2, 3027, 1:27 pm
		•	1A03091	Order diterima	Jakarta Barat	Nanado	Sicepat	Juli 8, 2017, 1:27 pm
		+	1405091	Urder diterima	Jakartabarat	wanado	sicepat	Juli 8, 2017, 227 pm

Fig 6 : Order List View

Sender				Receiver		
Name		: nOWry		Neme	-	VJ×HAM B
Phone		: +6289768025	13	Phone	:	+628109237586
Origin				Destination		
Address 1		: Jelember 12	3	Address 1	:	Jalan Sudirman
Address 2		-		Address 2	-	
Postcode		: 11460		Postcode	-	95239
Area		: Jelambar Ba	ru -	Area	-	Mahawu
Suburb		: Grogol Peter	aburan	Suburb	-	Tuminiting
City		: Jekerte Bere	ŧ	City	-	Manado
Province		: DKI Jekerte		Province	-	Sulawesi Utara
Courier				Package		
Neme		: Si Cepst - RE	3 (Regular)	Package Type	-	Paket Kecil
Service Type		: Regular		Package Dimension	-	30 cm × 10 cm × 20 cm
Shipping Time		: 2-3 dey(s)		Package Weight	-	1 kg
Use Insurance?		: NO		Item Type	-	tes
Rete		: Rp 47,000.00		Item Value	-	Rp 420,000.00
Insurance		: Rp 0.00				
				Driver		
				Name	-	Budi 2 Handoko
				Phone	-	0888111222
Status History				Important Information		
Date	Shipper Status	Logistic Status	Logistic Status Description	Pickup Time	-	July 8, 2017, 3:14 pm
July 8, 2017,	Order Diterime	Order Diterime	Order sudah diterima	Creation Time	-	July 8, 2017, 2:27 pm
2:27 pm	order Diterima	Order Diterima	order sudan diterima	Last Updated Date	-	July 8, 2017, 2:27 pm

Fig 7 : Order Detail View



#### Fig 8 : Burndown Chart

From the burndown chart above can be seen that the execution of each task given is faster than the planned estimate. This can be seen from the Actual Task Burned (blue) line below the Estimated Task Burned (purple) line. The total task before doing is 32 and is estimated to be reduced by 4 hours per day. In the process, the task is more reduced on the 2nd, 3rd, 4th, 5th, 6th and 7th day and on the 8th day the entire task is done.

#### 6.3 Sprint 2

Here are sprint backlogs, system interfaces, and burndown chart results in Sprint 2.

Backlog Item	Story Points (1 point = 2 hours)	Original Estimate (in hour)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Sprint Review and Retrospective
User Story #4	5												
Checkin Order	5	10	8	5	2	0	0	0	0	0	0	0	0
User Story #5	6												
Checkout order	6	12	12	12	12	10	6	2	0	0	0	0	0
User Story #6	4		I	1	I		1	1		1			L
Input AWB Number	4	8	8	8	8	8	8	8	4	1	0	0	0
Total	15	30	28	25	22	18	14	10	4	1	0	0	0

Fig 9 : Sprint Backlog

Shipper.id						Sign out
Orders	Check-In Order Operatioanl City :				аH	ome > Check-in Order
in orders	Jakarta Barat Check-in Order Order ID No Data available	, Lates Status e in table	Origin City	Dest City	Check-in Order Ch Counter Name	ecked-out Order Date
	Showing D to D of C	) entires			Activate	ecked-out Order Windows rgs to activite Windows

Fig 10 : Check-in Order View

Orders     Operatioanl City:     Jakarta Barat     Jakarta Barat     Check-Out Order     Checked-In Order     Checked-In Order     Checked-In Order     Checked-In Order     Order > Pos Indonesia     1     Showing 1 to 1 of 1 Entries      Manifested Order List     e Order > Manifest Date     Total Order     Order > Manifest Date     Ist     Logistic Name     Manifest Date     Ist     Logistic Name     Is/05/2017 11:24AM     Manifest Detail     Manifest Detail     Ison Parcel     O7/04/2017 4:32 PM     1     Manifest Detail     REX     O7/04/2017 4:14 PM     1     Manifest Detail	Shipper.id				Signaut	
Check-Out Order  Check-					@ Order > Check-out Order	
Logistic Name       Total Order         ●       Pos Indonesia       1         Showing 1 to 1 of 1 Entries       # Order > Manifested Order       # Order > Manifested Order         Manifested Order List       # Order > Manifest Date       # Order > Manifest Date         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Date         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Date         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Date         Rex       07/04/2017 4:32 PM       1       Manifest Date       Imatifest Date	# Orders	Jakarta Barat	*			
Logistic Name Total Order   * Pos Indonesia 1   * Pos Indonesia 1   Showing 1 to 1 of 1 Entries * Order > Manifested Order   Manifested Order List * Order > Manifested Order   Manifest Order List * Order > Manifest Date   Logistic Name Manifest Date   Pos Indonesia 18/05/2017 11:24 AM   1 Manifest Detail I   Pos Indonesia 18/05/2017 11:24 AM   Lion Parcel 07/04/2017 4:32 PM   Lion Parcel 07/04/2017 4:14 PM   1 Manifest Detail I   REX 07/04/2017 4:14 PM		Check-Out Order				
*       Pos Indonesia       1         *       Pos Indonesia       1         Showing 1 to 1 of 1 Entries       * Order > Manifested Order List       * Order > Manifested Order List         Manifested Order List       * Order > Manifest Date       Total Order         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Detail 1         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Detail 1         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Detail 1         Rex       07/04/2017 4:14 PM       1       Manifest Detail 1					Checked-In Order	
Manifested Order List       # Order > Manifested Order         Manifested Order List       # Order > Manifest Date       Total Order         Logistic Name       Manifest Date       Total Order         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Date         Pos Indonesia       18/05/2017 11:24AM       1       Manifest Date       Detail I         Lion Parcel       07/04/2017 4:52 PM       1       Manifest Detail I         REX       07/04/2017 4:14 PM       1       Manifest Detail I		Log	stic Name	Tota	Total Order	
Manifested Order List       ** Order > Manifested Order         Logistic Name       Manifest Date       Total Order         Pos Indonesia       18/05/2017 11:24 AM       1       Manifest Detail I         Pos Indonesia       18/05/2017 11:24 AM       1       Manifest Detail I         Lion Parcel       07/04/2017 4:52 PM       1       Manifest Detail I         REX       07/04/2017 4:14 PM       1       Manifest Detail I		+ Pos	ndonesia	1		
Manifested Order List       Logistic Name       Manifest Date       Total Order         Pos Indonesia       18/05/2017 11:24 AM       1       Manifest Dateil I         Pos Indonesia       18/05/2017 11:24 AM       1       Manifest Dateil I         Lion Parcel       07/04/2017 4:52 PM       1       Manifest Dateil I         REX       07/04/2017 4:14 PM       1       Manifest Dateil I		Showing 1 to 1 of 1	. Entries			
Pos Indonesia       18/05/2017 11:24 AM       1       Manifest       Detail         Pos Indonesia       18/05/2017 11:24 AM       1       Manifest       Detail         Lion Parcel       07/04/2017 4:52 PM       1       Manifest       Detail         REX       07/04/2017 4:14 PM       1       Manifest       Detail					e Order > Manifested Order List	
Pos Indonesia     18/05/2017 11:24AM     1     Manifest     Detail I       Lion Parcel     07/04/2017 4:52 PM     1     Manifest     Detail I       REX     07/04/2017 4:14 PM     1     Manifest     Detail I		Logistic Name	Manifest Date	Total Order		
Lion Parcel 07/04/2017 4:52 PM 1 Manifest Detail 1 REX 07/04/2017 4:14 PM 1 Manifest Detail 1		Pos Indonesia	18/05/2017 11:24 AM	1	Manifest Detail Manifest	
REX 07/04/2017 4:14 PM 1 Manifest Detail I		Pos Indonesia	18/05/2017 11:24 AM	1	Manifest Detail Manifest	
Wantest Provide		Lion Parcel	07/04/2017 4:52 PM	1	Manifest Detail Manifest	
		REX	07/04/2017 4:14 PM	1	Manifest Detail Manifest	
Showing 1 to 4 of 4 Entries		Showing 1 to 4 of 4	Entries			

Fig 11 : Check-out Order View

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					59
gent LAC alcota	Check-Out Order Operatioanl City :				@ Order > Check-out Ord
Orders <	Jakarta Barat	•			
	Check-Out Order				
					Checked-In Order
	Logisti	c Name		Total Order	
	- Posino	donesia		1(1selected)	
	Select/Unselect				Check Out Selected
	Special ID	Consigner Name	Origin City	Consignee Name	Destination City
	A516	Thompson Napitulu	Jakarta Barat	Budi	Deli Serdang
	Showing 1 to 1 of 1	Entries			Activate Windows
	Manifested Order Li	st			& Order > Manifested Order I
	Manifested Order Li	st			
	Logistic Name	Manifest Date	Total Orde	er	
	Pos Indonesia	18/05/2017 11:24 AM	1	Manifest	Detail Manifest
	Pos Indonesia	18/05/2017 11:24 AM	1	Manifest	Detail Manifest
	Lion Parcel	07/04/2017 4:52 PM	1	Manifest	Detail Manifest
	REX	07/04/2017 4:14 PM	1	Manifest	Detail Manifest
	in the second se				Detter mentest

Fig 12 : Check-out Order Detail View



#### Fig 13 : Burndown Chart

#### 6.4 Testing

Testing is done using Blackbox Testing method which the result can be seen as follows:

1. View Order List				
Nama Fungsi	View Order List			
URL	http://localhost/shipper-			
	skripsi/order/jsonForOrderData			
Metode	GET			
Ukuran Data yang diterima	20.9 KB			
Jumlah Data Tersimpan	16275 dokumen			

No.	MongoDB Connection		MongoDB Indexing		Keterangan
Percobaan			dengan	ElasticSearch	
	Status	Lama Waktu	Status	Lama Waktu	1
		(dalam detik)		(dalam detik)	
1.	200	19.64	200	19.29	Lebih Baik
2.	200	14.29	200	14.56	Kurang Baik
3.	200	14.72	200	14.40	Lebih Baik
4.	200	14.41	200	14.21	Lebih Baik
5.	200	14.62	200	14.40	Lebih Baik
6.	200	19.64	200	19.29	Lebih Baik
7.	200	14.56	200	14.29	Lebih Baik
8.	200	14.67	200	14.43	Lebih Baik
9.	200	14.90	200	14.63	Lebih Baik
10.	200	14.58	200	14.40	Lebih Baik
Rata-rata w	aktu	15.60		15.39	Lebih Baik

Fig 14 : Test Result – View Order List

From the test results table above can be seen that the average access time for demand data function View Order List faster 0.21 seconds or by 1.34%.

The results obtained from the average non-Elasticsearch of 15.60 seconds subtracted by the average Elasticsearch for 15.39 seconds.

2. View Order Detail				
Nama Fungsi	View Order Detail			
URL	http://localhost/shipper-skripsi/order/read/			
	1B06840			
Metode	GET			
Ukuran Data yang diterima	12.4 KB			
Jumlah Data Tersimpan	16275 dokumen			

No.	MongoDB Connection		MongoDB Indexing		Keterangan
Percobaan			dengan ElasticSearch		
	Status	Lama Waktu	Status	Lama Waktu	-
		(dalam detik)		(dalam detik)	
1.	200	7.2	200	8.9	Kurang Baik
2.	200	7.30	200	7.47	Kurang Baik
3.	200	7.28	200	7.23	Lebih Baik
4.	200	7.46	200	7.26	Lebih Baik
5.	200	7.39	200	7.25	Lebih Baik
6.	200	7.36	200	7.21	Lebih Baik
7.	200	8.05	200	7.50	Lebih Baik
8.	200	12.72	200	7.66	Lebih Baik
9.	200	9.0	200	7.68	Lebih Baik
10.	200	7.40	200	7.57	Kurang Baik
Rata-rata waktu		8.11		7.57	Lebih Baik

#### Fig 14 : Test Result – View Order Detail

From the test results table above can be seen that the average access time for demand data function View Order Detail faster 0.54 seconds or by 6.65%.

The results obtained from the average non-Elasticsearch of 8.11 seconds deducted by the average Elasticsearch for 7.57 seconds.

3. Search Order (For 1 letter)					
Nama Fungsi Search Order					
URL	http://localhost/shipper-				
	skripsi/order/jsonForOrderData?sSearch=X				
Metode	GET				
Ukuran Data yang diterima	1.0 KB				
Jumlah Data Tersimpan	16275 dokumen				
Kata kunci yang dicari	X				

No.	MongoDB Connection		MongoDB Indexing		Keterangan
Percobaan			dengan ElasticSearch		
	Status	Lama Waktu	Status	Lama Waktu	1
		(dalam detik)		(dalam detik)	
1.	200	7.65	200	6.89	Lebih Baik
2.	200	7.58	200	7.22	Lebih Baik
3.	200	7.67	200	7.11	Lebih Baik
4.	200	7.56	200	7.14	Lebih Baik
5.	200	7.55	200	7.03	Lebih Baik
6.	200	7.68	200	7.21	Lebih Baik
7.	200	7.89	200	7.34	Lebih Baik
8.	200	7.66	200	7.11	Lebih Baik
9.	200	7.54	200	7.13	Lebih Baik
10.	200	7.56	200	7.02	Lebih Baik
Rata-rata wa	iktu	7.63		7.12	Lebih Baik

#### Fig 15 : Test Result – Search Order 1

From the test results table above can be seen that the average access time for data query Search Order function with search keywords as much as 1 letter faster 0.51 seconds or equal to 6.66%.

The result is obtained from the average non-Elasticsearch of 7.63 seconds deducted by Elasticsearch average of 7.12 seconds.

4. Search Order (For 5 letters)				
Nama Fungsi	Search Order			
URL	http://localhost/shipper-			
	skripsi/order/jsonForOrderData?sSearch=			
	bUxCH			
Metode	GET			
Ukuran Data yang diterima	1.0 KB			
Jumlah Data Tersimpan	16275 dokumen			
Kata kunci yang dicari	bUxCH			

No.	MongoDB Connection		MongoDB Indexing		Keterangan
Percobaan			dengan ElasticSearch		
	Status	Lama Waktu	Status	Lama Waktu	
		(dalam detik)		(dalam detik)	
11.	200	8.1	200	7.52	Lebih Baik
12.	200	8.29	200	7.20	Lebih Baik
13.	200	8.14	200	7.28	Lebih Baik
14.	200	7.90	200	7.20	Lebih Baik
15.	200	7.85	200	7.23	Lebih Baik
16.	200	8.09	200	7.21	Lebih Baik
17.	200	8.11	200	7.24	Lebih Baik
18.	200	8.10	200	7.22	Lebih Baik
19.	200	8.05	200	7.20	Lebih Baik
20.	200	8.12	200	7.31	Lebih Baik
Rata-rata waktu		8.07		7.26	Lebih Baik

#### Fig 16 : Test Result – Search Order 5

From the test results table above can be seen that the average access time for data query Search Order function with search keywords as much as 5 letters faster 0.81 seconds or 10.01%. The results obtained from the average non-Elasticsearch of 8.07 seconds deducted by Elasticsearch average of 7.26 seconds.

Nama Fungsi	Search Order
URL	http://localhost/shipper-
	skripsi/order/jsonForOrderData?sSearch=
	RDJzHuBUfI
Metode	GET
Ukuran Data yang diterima	1.0 KB
Jumlah Data Tersimpan	16275 dokumen
Kata kunci yang dicari	RDJzHuBUfI

No. Percobaan	MongoDB Connection		MongoDB Indexing dengan ElasticSearch		Keterangan
1 creeouur	Status	Lama Waktu	Status	Lama Waktu	-
		(dalam detik)		(dalam detik)	
21.	200	7.85	200	7.29	Lebih Baik
22.	200	8.10	200	7.35	Lebih Baik
23.	200	8.13	200	7.46	Lebih Baik
24.	200	7.91	200	7.26	Lebih Baik
25.	200	7.86	200	7.22	Lebih Baik
26.	200	8.13	200	7.24	Lebih Baik
27.	200	8.05	200	7.21	Lebih Baik
28.	200	8.11	200	7.22	Lebih Baik
29.	200	8.20	200	7.31	Lebih Baik
30.	200	7.96	200	7.23	Lebih Baik
Rata-rata waktu		8.03		7.27	Lebih Baik

#### Fig 16 : Test Result – Search Order 5

From the test results table above can be seen that the average access time for data query Search Order function with search keywords as much as 10 letters faster 0.76 seconds or by 46%. The results obtained from the average non-Elasticsearch of 8.03 seconds deducted by Elasticsearch average of 7.27 seconds.

#### 7. CONCLUSION

Based on the results of research on "Implementation Elasticsearch Search Engine on Order Management System" can be concluded as follows:

- 1. In this research has been implemented search-engine Elasticsearch into Order Management System in a company. Elasticsearch has been applied to the system in the form of libraries that have been used in search order data. Therefore, it can be said that Elasticsearch can be applied and used well into the system.
- 2. In this study also can be concluded that Elasticsearch has an influence in improving the performance Order Management System. It is concluded from the comparison made between order management systems that have been

implemented Elasticsearch with similar system but not implement Elasticsearch. From the comparison results found that the system that has implement Elasticsearch faster in the access time about 10.01% of the system that is not implement Elasticsearch for search function based on keyword or keyword.

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