

# Technical Disclosure Commons

---

Defensive Publications Series

---

June 2020

## DYNAMIC GENERATION OF AN ONTOLOGY-BASED AI SCHEMA FOR CHATBOTS

Vishal Palliyathu

Deepti Tiwari

Anu Kothari

Vineet Upendra

Ritu Gupta

Follow this and additional works at: [https://www.tdcommons.org/dpubs\\_series](https://www.tdcommons.org/dpubs_series)

---

### Recommended Citation

Palliyathu, Vishal; Tiwari, Deepti; Kothari, Anu; Upendra, Vineet; and Gupta, Ritu, "DYNAMIC GENERATION OF AN ONTOLOGY-BASED AI SCHEMA FOR CHATBOTS", Technical Disclosure Commons, (June 29, 2020) [https://www.tdcommons.org/dpubs\\_series/3368](https://www.tdcommons.org/dpubs_series/3368)



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

## DYNAMIC GENERATION OF AN ONTOLOGY-BASED AI SCHEMA FOR CHATBOTS

### AUTHORS:

Vishal Palliyathu  
Deepti Tiwari  
Anu Kothari  
Vineet Upendra  
Ritu Gupta

### ABSTRACT

Strategic investments in Artificial Intelligence may enable companies to gain business advantages. There are challenges in using generic natural language processing (NLP) capabilities with complex products and with content that requires specialized domain-specific terminologies. Darwin Information Typing Architecture (DITA)-generated AI schema can leverage enterprise source code to train bots or any other conversational systems to improve the accuracy levels without any manual intervention. A well-defined AI schema is generated from the DITA source files that contain an ontology framework of Intents, Entities, Dialog nodes, along with child nodes, as a result. The schema can be depicted as a JSON file.

### DETAILED DESCRIPTION

Conversational Bot Frameworks are fast gaining acceptance in the industry, but a considerable challenge in training AI conversational bots is about empowering them with intents, entities, and well-defined dialogs nodes. The identification, classification, and generation of these primary building blocks is a time-consuming and resource-intensive process, which also needs frequent revisions and tweaking. Another major roadblock while scaling the bot is the problem of accuracy. Precision is often compromised when there is a choice of related answers, and when there is exponential growth of information with every release.

Semantically enriched information sets such as DITA can be tokenized into its most granular components to generate the core theses and routines, and to identify the order of relationship among the entities. Using the algorithm, every topic is analyzed to determine the most likely thesis, in relation to its parent and then with relation to its siblings. The

algorithm identifies the thesis from the DITA source files and, using a weighed algorithm, determines the routines and sub-routines. An ontology is generated based on the varied relationships that occur between the plotted theses and their routines and sub-routines.

Classes, sub-classes and their hierarchies can be extrapolated from semantically enriched information sets based on the Ontology, and an AI schema is generated. The Intents, Entities, and Dialog nodes can be extrapolated from semantically enriched information sets.

DITA is the industry standard on technical communication and has diverse domain applications, as stand-alone documents, online information centers, embedded assistance, and also customized run time generation of help systems. DITA provides a framework to create, build and deliver complex technical information sets. A growing list DITA Conferences across the globe speaks volumes about the thriving communities, adoption, and robustness of the DITA framework. A brief introduction on these files, their broad behavior and characteristics are explained:

**DITA:** Information development source files, having the “.dita” or “.xml” extension. As the XML model for authoring, transforming and publishing, DITA provides capabilities for singlesource publishing to PDF, HTML, TROFF, and ePub. Typical product source files might range from a few hundred to thousands of DITA files. DITA files are specialized to contain different types of information, such as conceptual information (concept specialization), procedural steps (task specialization), and reference (reference specialization). DITA specializations are based on the DTD and schema.

**DITAMAP:** A “.ditamap” file organizes references to DITA files, to be rendered as a document. It also indicates relationships across the DITA files. A DITAMP might organize and list anywhere between a few to hundreds of DITA files, depending on the scope of documentation. A typical product source might include dozens of DITAMAPS. A DITAMAP might contain multiple layers of nesting information. Although 4 layers of nesting is recommended, at times one might see nesting up to the 6th or 7th layers.

This disclosure leverages the DITA and DITAMAP constructs to create a JSON consumable file for a Conversational Bot. The examples used in this disclosure is limited to using the DITA files and DITAMAP files. Only the topic titles of the DITA files are used. All examples used in this disclosure is based on the Segment Routing document.

**Primary Thesis:** The Primary Thesis is a primary concept that is being dealt or discussed with regard to a DITAMAP. The Primary Thesis is a noun. The Primary Thesis describes in detail about the new product or feature or a component. Examples are “Smart Licensing” and “Segment Routing.” In some cases, the Primary Thesis can also be captured from the first “Feature Information” topic in a DITAMAP.

**Routines:** Routines are the various actions or supplementary information that pertains to a Primary Thesis. Common Routines across the industry are Configuring, Installing, Troubleshooting, and so on. In some cases, Feature Information, Additional References and Restrictions are also additional routines that enrich the information sets.

- *Restrictions* on using the Sample Feature
- *Configuring* the Sample Feature
- *Installing* the Sample Feature
- *Additional References* on the Sample Feature
- *Troubleshooting* issues on the Sample Feature
- *Feature Information* on the Sample Feature

**Secondary Thesis:** Denotes the secondary noun-string.

**Ontology:** An Ontology is a set of concepts and categories in a subject area or domain that shows their properties and the relations between them.

**Class:** A class is a component of Ontology and can define collections or concepts. A class is an abstract group.

Examples of classes in Technical Communication include the following:

- Features (Segment Routing, PTP Clock Synchronization, Smart Licensing)
- Error Codes
- Bugs

**Sub-classes:** A sub-class is a component of a class. Examples of Sub-classes of the classes defined in this disclosure are:

- Features (Segment Routing, PTP Clock Synchronization, Smart Licensing)
- Error Codes
- Bugs

**Relationships:** This depicts the kind of associations that exist between two different classes. A Cognitive bot learns by the intents and entities that it is trained on. The

more corpus that the Bot goes through, the better would be the accuracy or precision of its answers. A brief introduction into the building blocks of a cognitive Bot is as:

**Intents:** An intent represents the purpose of a user's input.

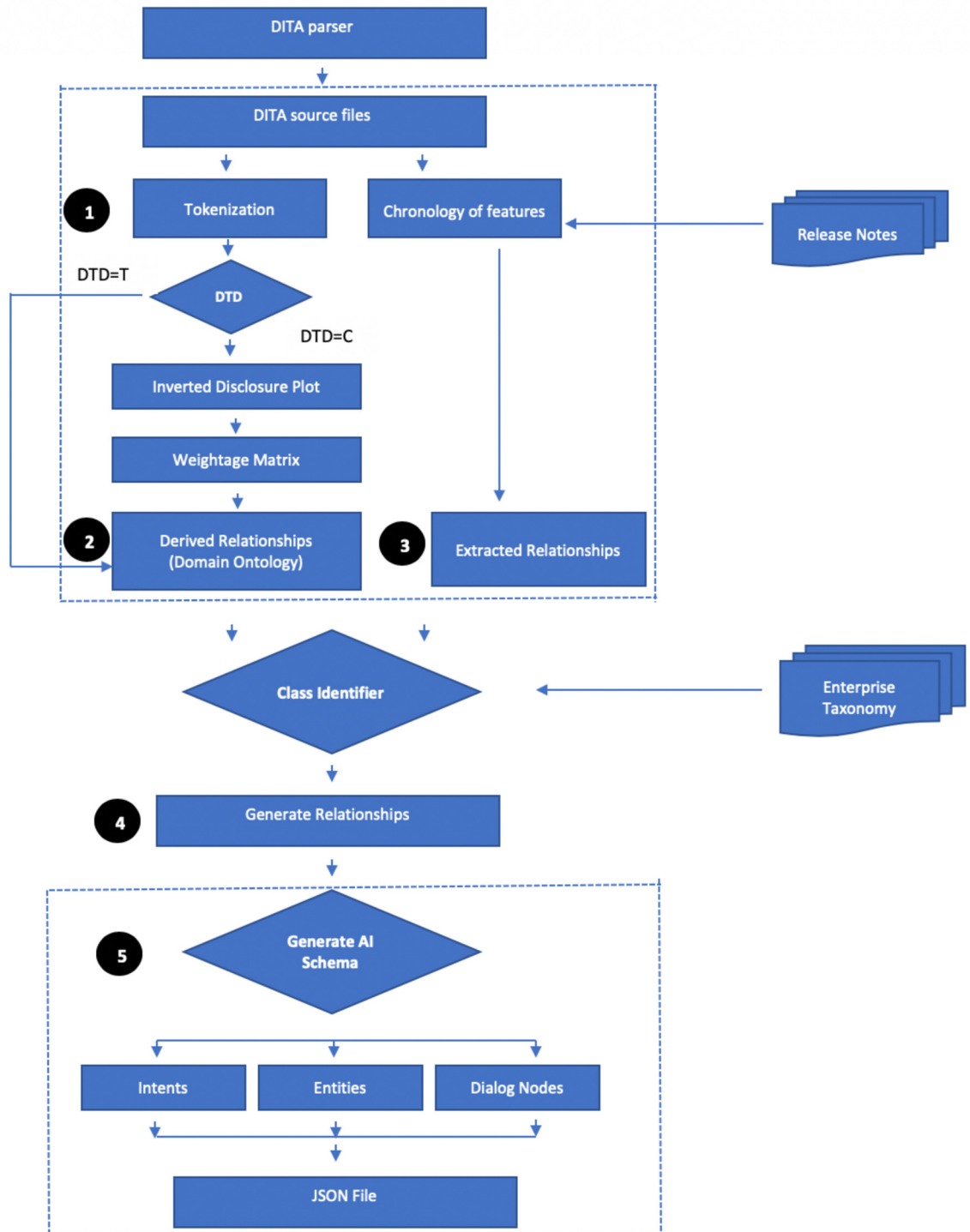
**Entities:** An entity represents the object/product/feature on which the task is performed on.

**Dialog Node:** A dialog node is a container for the information that responds to a query when the bot framework understands an intent and an entity.

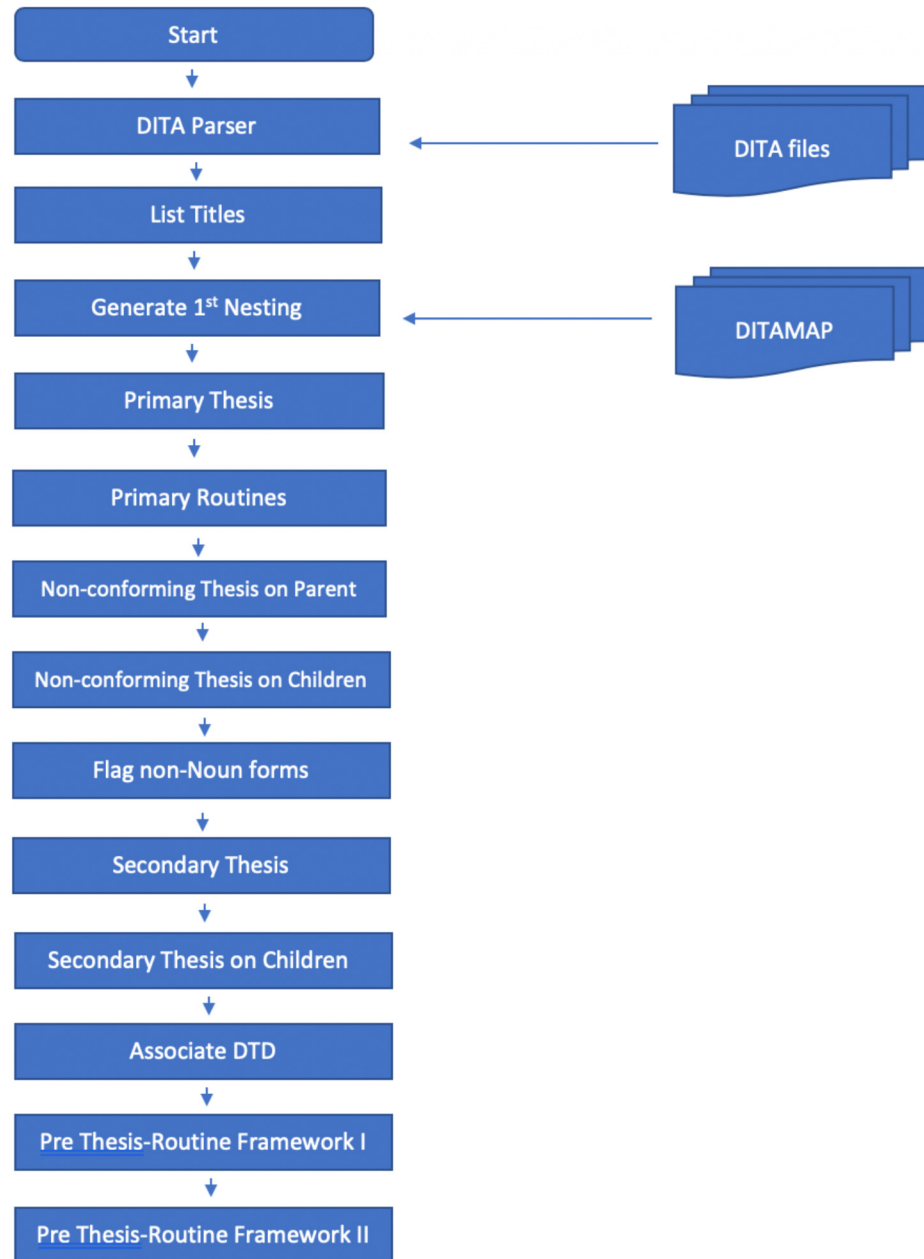
Intents and entities are continuously annotated, as new scenarios need the attention of architects and SME's to understand the subtle nuance and huge ramifications of an information knowledge base that is continuously in flux. A basic framework of the intents and entities are a good starting point as it frees up considerable resource time. A basic framework of the dialog node would be a huge step forward in speeding up the AI training aspect, with regard to any product or a solution.

### Flowchart Summary

The method is diagrammatically represented and explained in detail below.



## Part 1: Tokenization



The steps are explained in detail below. The example used for the explanation is Segment Routing.

1. Listing titles: All the First and Secondary hierarchy titles in a DITAMAP is listed to an excel sheet. The listing contains no information on the hierarchy or nesting.
2. Nesting: The information on the nesting is extracted from the DITAMAP. Only the parent and their immediate children are used. That is, the Nesting would contain information on only the first two layers of nesting from a DITAMAP.

A	B	C	D
			Introduction to Segment Routing
			Overview of Segment Routing
			How Segment Routing Works
			Examples for Segment Routing
			Benefits of Segment Routing
			Segment Routing Global Block
			Additional References for Segment Routing
			Feature Information for Introduction to Segment Routing
			Segment Routing With IS-IS v4 Node SID
			Restrictions for Segment Routing With IS-IS v4 Node SID
			Information About Segment Routing IS-IS v4 Node SID
			How to Configure Segment Routing —IS-IS v4 Node SID
			Configuration Examples for Segment Routing —IS-IS v4 Node SID
			Additional References for Segment Routing With IS-IS v4 Node SID
			Feature Information for Segment Routing—IS-IS v4 Node SID
			IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Prerequisites for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Additional References for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Feature Information for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Segment Routing Traffic Engineering With IS-IS
			Restrictions for Segment Routing-Traffic Engineering With IS-IS
			Information About Segment Routing Traffic Engineering With IS-IS
			How to Configure Segment Routing Traffic Engineering With IS-IS
			Additional References for Segment Routing Traffic Engineering With IS-IS
			Feature Information for Segment Routing -Traffic Engineering With IS-IS
			Segment Routing With OSPFv2 Node SID
			Information About Segment Routing With OSPFv2 Node SID
			How to Configure Segment Routing With OSPFv2 Node SID
			Additional References for Segment Routing With OSPFv2 Node SID
			Feature Information for Segment Routing With OSPFv2 Node SID
			OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
			Restrictions for Topology Independent Loop Free Alternate Fast Reroute
			Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute
			How to Configure Topology Independent Loop Free Alternate Fast Reroute
			Debugging Topology Independent Loop Free Alternate Fast Reroute
			Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute



3. Tokenization 1st step: Identify and markup the Primary Thesis on the topics. The primary noun is marked up on the DITAMAP. The primary noun can be identified from the Document Title, or, from the first Feature Information topic in the DITAMAP. The primary Thesis appear tokenized in red.

A	B	C
	Introduction to <b>Segment Routing</b>	
		Overview of <b>Segment Routing</b>
		How <b>Segment Routing</b> Works
		Examples for <b>Segment Routing</b>
		Benefits of <b>Segment Routing</b>
		<b>Segment Routing</b> Global Block
		Additional References for <b>Segment Routing</b>
		Feature Information for Introduction to <b>Segment Routing</b>
	<b>Segment Routing</b>	With IS-IS v4 Node SID
		Restrictions for <b>Segment Routing</b> With IS-IS v4 Node SID
		Information About <b>Segment Routing</b> IS-IS v4 Node SID
		How to Configure <b>Segment Routing</b> —IS-IS v4 Node SID
		Configuration Examples for <b>Segment Routing</b> —IS-IS v4 Node SID
		Additional References for <b>Segment Routing</b> With IS-IS v4 Node SID
		Feature Information for <b>Segment Routing</b> —IS-IS v4 Node SID
	IS-IS Link-protection	Topology Independent Loop Free Alternate Fast Reroute
		Prerequisites for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
		Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
		How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
		Additional References for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
		Feature Information for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Segment Routing</b>	Traffic Engineering With IS-IS
		Restrictions for <b>Segment Routing</b> -Traffic Engineering With IS-IS
		Information About <b>Segment Routing</b> Traffic Engineering With IS-IS
		How to Configure <b>Segment Routing</b> Traffic Engineering With IS-IS
		Additional References for <b>Segment Routing</b> Traffic Engineering With IS-IS
		Feature Information for <b>Segment Routing</b> -Traffic Engineering With IS-IS
	<b>Segment Routing</b>	With OSPFv2 Node SID
		Information About <b>Segment Routing</b> With OSPFv2 Node SID
		How to Configure <b>Segment Routing</b> With OSPFv2 Node SID
		Additional References for <b>Segment Routing</b> With OSPFv2 Node SID
		Feature Information for <b>Segment Routing</b> With OSPFv2 Node SID
	OSPFv2 Link-protection	Topology Independent Loop Free Alternate Fast Reroute
		Restrictions for Topology Independent Loop Free Alternate Fast Reroute
		Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute
		How to Configure Topology Independent Loop Free Alternate Fast Reroute
		Debugging Topology Independent Loop Free Alternate Fast Reroute
		Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute
		Additional References for OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
		Feature Information for OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Segment Routing</b>	Traffic Engineering With OSPF
		Restrictions for <b>Segment Routing</b> Traffic Engineering With OSPF
		Information About <b>Segment Routing</b> Traffic Engineering With OSPF

4. Tokenization 2nd step: Identify and markup the Primary Routines. The Primary Routines appear tokenized in blue.

	Introduction to <b>Segment Routing</b>
	Overview of <b>Segment Routing</b>
	How <b>Segment Routing</b> Works
	Examples for <b>Segment Routing</b>
	Benefits of <b>Segment Routing</b>
	<b>Segment Routing</b> Global Block
	<b>Additional References</b> for <b>Segment Routing</b>
	<b>Feature Information</b> for Introduction to <b>Segment Routing</b>
<b>Segment Routing</b>	With IS-IS v4 Node SID
	<b>Restrictions</b> for <b>Segment Routing</b> With IS-IS v4 Node SID
	<b>Information About</b> <b>Segment Routing</b> IS-IS v4 Node SID
	<b>How to Configure</b> <b>Segment Routing</b> —IS-IS v4 Node SID
	Configuration Examples for <b>Segment Routing</b> —IS-IS v4 Node SID
	<b>Additional References</b> for <b>Segment Routing</b> With IS-IS v4 Node SID
	<b>Feature Information</b> for <b>Segment Routing</b> —IS-IS v4 Node SID
	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Prerequisites</b> for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Information About</b> IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>How to Configure</b> IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Additional References</b> for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Feature Information</b> for IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
<b>Segment Routing</b>	Traffic Engineering With IS-IS
	<b>Restrictions</b> for <b>Segment Routing</b> -Traffic Engineering With IS-IS
	<b>Information About</b> <b>Segment Routing</b> Traffic Engineering With IS-IS
	<b>How to Configure</b> <b>Segment Routing</b> Traffic Engineering With IS-IS
	<b>Additional References</b> for <b>Segment Routing</b> Traffic Engineering With IS-IS
	<b>Feature Information</b> for <b>Segment Routing</b> -Traffic Engineering With IS-IS
<b>Segment Routing</b>	With OSPFv2 Node SID
	<b>Information About</b> <b>Segment Routing</b> With OSPFv2 Node SID
	<b>How to Configure</b> <b>Segment Routing</b> With OSPFv2 Node SID
	<b>Additional References</b> for <b>Segment Routing</b> With OSPFv2 Node SID
	<b>Feature Information</b> for <b>Segment Routing</b> With OSPFv2 Node SID
	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
	Restrictions for Topology Independent Loop Free Alternate Fast Reroute
	Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute
	How to Configure Topology Independent Loop Free Alternate Fast Reroute
	Debugging Topology Independent Loop Free Alternate Fast Reroute
	Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute
	Additional References for OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
	Feature Information for OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
<b>Segment Routing</b>	Traffic Engineering With OSPF
	<b>Restrictions</b> for <b>Segment Routing</b> Traffic Engineering With OSPF
	<b>Information About</b> <b>Segment Routing</b> Traffic Engineering With OSPF

5. Tokenization 3rd step: Identify and markup Non-conforming Thesis on the child topics and subsequently, their descendants. Non-conforming Thesis are noun strings on parent topics that have no Primary Thesis associated with them.

A	B	C
	Introduction to <b>Segment Routing</b>	
		Overview of <b>Segment Routing</b>
		How <b>Segment Routing</b> Works
		Examples for <b>Segment Routing</b>
		Benefits of <b>Segment Routing</b>
		<b>Segment Routing</b> Global Block
		<b>Additional References</b> for <b>Segment Routing</b>
		<b>Feature Information</b> for Introduction to <b>Segment Routing</b>
0	<b>Segment Routing</b>	With IS-IS v4 Node SID
1		<b>Restrictions</b> for <b>Segment Routing</b> With IS-IS v4 Node SID
2		<b>Information About Segment Routing</b> IS-IS v4 Node SID
3		<b>How to Configure Segment Routing</b> —IS-IS v4 Node SID
4		Configuration Examples for <b>Segment Routing</b> —IS-IS v4 Node SID
5		<b>Additional References</b> for <b>Segment Routing</b> With IS-IS v4 Node SID
6		<b>Feature Information</b> for <b>Segment Routing</b> —IS-IS v4 Node SID
7	<b>IS-IS Link-protection</b>	<b>Topology Independent Loop Free Alternate Fast Reroute</b>
8		<b>Prerequisites</b> for <b>IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
9		<b>Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
0		<b>How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
1		<b>Additional References</b> for <b>IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
2		<b>Feature Information</b> for <b>IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
3	<b>Segment Routing</b>	Traffic Engineering With IS-IS
4		<b>Restrictions</b> for <b>Segment Routing</b> -Traffic Engineering With IS-IS
5		<b>Information About Segment Routing</b> Traffic Engineering With IS-IS
6		<b>How to Configure Segment Routing</b> Traffic Engineering With IS-IS
7		<b>Additional References</b> for <b>Segment Routing</b> Traffic Engineering With IS-IS
8		<b>Feature Information</b> for <b>Segment Routing</b> -Traffic Engineering With IS-IS
9	<b>Segment Routing</b>	With OSPFv2 Node SID
0		<b>Information About Segment Routing</b> With OSPFv2 Node SID
1		<b>How to Configure Segment Routing</b> With OSPFv2 Node SID
2		<b>Additional References</b> for <b>Segment Routing</b> With OSPFv2 Node SID
3		<b>Feature Information</b> for <b>Segment Routing</b> With OSPFv2 Node SID
4	<b>OSPFv2 Link-protection</b>	<b>Topology Independent Loop Free Alternate Fast Reroute</b>
5		<b>Restrictions</b> for <b>Topology Independent Loop Free Alternate Fast Reroute</b>
6		<b>Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute</b>
7		<b>How to Configure Topology Independent Loop Free Alternate Fast Reroute</b>
8		<b>Debugging Topology Independent Loop Free Alternate Fast Reroute</b>
9		Examples: <b>OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute</b>
0		<b>Additional References</b> for <b>OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
1		<b>Feature Information</b> for <b>OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
2	<b>Segment Routing</b>	Traffic Engineering With OSPF
3		<b>Restrictions</b> for <b>Segment Routing</b> Traffic Engineering With OSPF
4		<b>Information About Segment Routing</b> Traffic Engineering With OSPF

6. Tokenization 4th step: Identify and markup Primary Routines for parent and children having Non-conforming Thesis. Derivative of Step 5.
7. Tokenization 5th step: Flag non-Noun forms. Remove and discard them from the tokenization framework.

A	B	C	D	E
	Introduction to <b>Segment Routing</b>			
	Overview - <b>Segment Routing</b>		of	
	How <b>Segment Routing</b> Works			
	Examples - <b>Segment Routing</b>		for	
	Benefits - <b>Segment Routing</b>		of	
	<b>Segment Routing</b> Global Block			
	Additional References - <b>Segment Routing</b>		for	
	Feature Information - Introduction <b>Segment Routing</b>		for, to	
	<b>Segment Routing</b> - IS-IS v4 Node SID		with	
	Restrictions <b>Segment Routing</b> - IS-IS v4 Node SID		for, with	
	Information About <b>Segment Routing</b> IS-IS v4 Node SID			
	How to Configure <b>Segment Routing</b> — IS-IS v4 Node SID			
	Configuration Examples <b>Segment Routing</b> - IS-IS v4 Node SID		for	
	Additional References <b>Segment Routing</b> - IS-IS v4 Node SID		for	
	Feature Information <b>Segment Routing</b> - IS-IS v4 Node SID		for	
	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute			
	Prerequisites - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute		for	
	Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute			
	How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute			
	Additional References - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute		for	
	Feature Information - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute		for	
	<b>Segment Routing</b> Traffic Engineering - IS-IS		with	
	Restrictions - <b>Segment Routing</b> -Traffic Engineering IS-IS		for, With	
	Information About <b>Segment Routing</b> Traffic Engineering - IS-IS		With	
	How to Configure <b>Segment Routing</b> Traffic Engineering - IS-IS		With	
	Additional References - <b>Segment Routing</b> Traffic Engineering - IS-IS		for, with	
	Feature Information - <b>Segment Routing</b> -Traffic Engineering - IS-IS		for, with	
	<b>Segment Routing</b> OSPFv2 Node SID		With	
	Information About <b>Segment Routing</b> - OSPFv2 Node SID		With	
	How to Configure <b>Segment Routing</b> - OSPFv2 Node SID		With	
	Additional References <b>Segment Routing</b> - OSPFv2 Node SID		for, with	
	Feature Information - <b>Segment Routing</b> - OSPFv2 Node SID		for, with	
	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute			
	Restrictions - Topology Independent Loop Free Alternate Fast Reroute		for	
	Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute			
	How to Configure Topology Independent Loop Free Alternate Fast Reroute			
	Debugging Topology Independent Loop Free Alternate Fast Reroute			
	Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute			
	Additional References - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute		for	
	Feature Information - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute		for	
	<b>Segment Routing</b> Traffic Engineering - OSPF		With	
	Restrictions - <b>Segment Routing</b> Traffic Engineering - OSPF		for, with	
	Information About <b>Segment Routing</b> Traffic Engineering - OSPF		with	

8. Tokenization 6th step: Identify and markup Secondary Thesis on the parent topics.
  9. Tokenization 7th step: Identify and markup Secondary Thesis on the child topics. (The child topics would inherit the Secondary Thesis from their parents.)
- The Secondary Thesis appear marked in orange.

	Introduction to <b>Segment Routing</b>
	Overview - <b>Segment Routing</b>
	How <b>Segment Routing</b> Works
	Examples - <b>Segment Routing</b>
	Benefits - <b>Segment Routing</b>
	<b>Segment Routing</b> Global Block
	<b>Additional References</b> - <b>Segment Routing</b>
	<b>Feature Information</b> - Introduction <b>Segment Routing</b>
	<b>Segment Routing</b> - IS-IS v4 Node SID
	Restrictions <b>Segment Routing</b> - IS-IS v4 Node SID
	Information About <b>Segment Routing</b> IS-IS v4 Node SID
	How to Configure <b>Segment Routing</b> — IS-IS v4 Node SID
	Configuration Examples <b>Segment Routing</b> - IS-IS v4 Node SID
	<b>Additional References</b> <b>Segment Routing</b> - IS-IS v4 Node SID
	<b>Feature Information</b> <b>Segment Routing</b> - IS-IS v4 Node SID
	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	Prerequisites - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Additional References</b> - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Feature Information</b> - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute
	<b>Segment Routing</b> Traffic Engineering - IS-IS
	Restrictions - <b>Segment Routing</b> -Traffic Engineering IS-IS
	Information About <b>Segment Routing</b> Traffic Engineering - IS-IS
	How to Configure <b>Segment Routing</b> Traffic Engineering - IS-IS
	<b>Additional References</b> - <b>Segment Routing</b> Traffic Engineering - IS-IS
	<b>Feature Information</b> - <b>Segment Routing</b> -Traffic Engineering - IS-IS
	<b>Segment Routing</b> OSPFv2 Node SID
	Information About <b>Segment Routing</b> - OSPFv2 Node SID
	How to Configure <b>Segment Routing</b> - OSPFv2 Node SID
	<b>Additional References</b> <b>Segment Routing</b> - OSPFv2 Node SID
	<b>Feature Information</b> - <b>Segment Routing</b> - OSPFv2 Node SID
	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute
	Restrictions - Topology Independent Loop Free Alternate Fast Reroute
	Information About <b>OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute</b>
	How to Configure Topology Independent Loop Free Alternate Fast Reroute
	Debugging Topology Independent Loop Free Alternate Fast Reroute
	Examples: <b>OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute</b>
	<b>Additional References</b> - <b>OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
	<b>Feature Information</b> - <b>OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute</b>
	<b>Segment Routing</b> Traffic Engineering - OSPF
	Restrictions - <b>Segment Routing</b> Traffic Engineering - OSPF
	Information About <b>Segment Routing</b> Traffic Engineering - OSPF

10. Pre-TR Framework 1: Associate the DTD's with all the tokenized and listed topics. The Framework appears on the right of the tokenized content. Columns are listed by their Primary Thesis, Secondary Thesis and Routines that are plotted from the tokenized content.

DTD	Topic	Primary Thesis	Secondary Thesis	Routine
C	Introduction to Segment Routing	Segment Routing		
C	Overview - Segment Routing	**		
C	How Segment Routing Works	**		
C	Examples - Segment Routing	**		
C	Benefits - Segment Routing	**		
C	Segment Routing Global Block	**		
C	Additional References - Segment Routing	**		
C	Feature Information - Introduction Segment Routing	**		
C	Segment Routing - IS-IS v4 Node SID	**	IS-IS v4 Node SID	
C	Restrictions Segment Routing - IS-IS v4 Node SID	**	**	Restrictions
C	Information About Segment Routing IS-IS v4 Node SID	**	**	Information About
T	How to Configure Segment Routing - IS-IS v4 Node SID	**	**	How to Configure
C	Configuration Examples Segment Routing - IS-IS v4 Node SID	**	**	Configuration Examples
C	Additional References Segment Routing - IS-IS v4 Node SID	**	**	Additional references
C	Feature Information Segment Routing - IS-IS v4 Node SID	**	**	Feature Information
C	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute		IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Prerequisites - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Prerequisites
C	Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
C	Additional References - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - IS-IS	**	Traffic Engineering - IS-IS	
C	Restrictions - Segment Routing Traffic Engineering IS-IS	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - IS-IS	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - IS-IS	**	**	How to Configure
C	Additional References - Segment Routing Traffic Engineering - IS-IS	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - IS-IS	**	**	Feature Information
C	Segment Routing OSPFv2 Node SID	**	OSPFv2 Node SID	
C	Information About Segment Routing - OSPFv2 Node SID	**	**	Information About
T	How to Configure Segment Routing - OSPFv2 Node SID	**	**	How to Configure
C	Additional References Segment Routing - OSPFv2 Node SID	**	**	Additional references
C	Feature Information - Segment Routing - OSPFv2 Node SID	**	**	Feature Information
C	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute		OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Restrictions - Topology Independent Loop Free Alternate Fast Reroute	**	**	Restrictions
C	Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
T	Debugging Topology Independent Loop Free Alternate Fast Reroute	**	**	Debugging
C	Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Examples
C	Additional References - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - OSPF	**	Traffic Engineering - OSPF	
C	Restrictions - Segment Routing Traffic Engineering - OSPF	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - OSPF	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - OSPF	**	**	How to Configure
T	Verifying Configuration - SR-TE Tunnels	**	**	Verifying configuration
C	Additional References - Segment Routing Traffic Engineering - OSPF	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - OSPF	**	**	Feature Information
C	BGP Dynamic Segment Routing Traffic Engineering	**	BGP Dynamic + Traffic Engineering	

11. Pre-TR Framework 2: Identify un-tokenized topics.

DTD	Topic	Primary Thesis	Secondary Thesis	Routine
C	Introduction to Segment Routing	Segment Routing		
C	Overview - Segment Routing	**		
C	How Segment Routing Works	**		
C	Examples - Segment Routing	**		
C	Benefits - Segment Routing	**		
C	Segment Routing Global Block	**		
C	Additional References - Segment Routing	**		
C	Feature Information - Introduction Segment Routing	**		
C	Segment Routing - IS-IS v4 Node SID	**	IS-IS v4 Node SID	
C	Restrictions Segment Routing - IS-IS v4 Node SID	**	**	Restrictions
C	Information About Segment Routing IS-IS v4 Node SID	**	**	Information About
T	How to Configure Segment Routing - IS-IS v4 Node SID	**	**	How to Configure
C	Configuration Examples Segment Routing - IS-IS v4 Node SID	**	**	Configuration Examples
C	Additional References Segment Routing - IS-IS v4 Node SID	**	**	Additional references
C	Feature Information Segment Routing - IS-IS v4 Node SID	**	**	Feature Information
C	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute		IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Prerequisites - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Prerequisites
C	Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
C	Additional References - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - IS-IS	**	Traffic Engineering - IS-IS	
C	Restrictions - Segment Routing Traffic Engineering IS-IS	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - IS-IS	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - IS-IS	**	**	How to Configure
C	Additional References - Segment Routing Traffic Engineering - IS-IS	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - IS-IS	**	**	Feature Information
C	Segment Routing OSPFv2 Node SID	**	OSPFv2 Node SID	
C	Information About Segment Routing - OSPFv2 Node SID	**	**	Information About
T	How to Configure Segment Routing - OSPFv2 Node SID	**	**	How to Configure
C	Additional References Segment Routing - OSPFv2 Node SID	**	**	Additional references
C	Feature Information - Segment Routing - OSPFv2 Node SID	**	**	Feature Information
C	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute		OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Restrictions - Topology Independent Loop Free Alternate Fast Reroute	**	**	Restrictions
C	Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
T	Debugging Topology Independent Loop Free Alternate Fast Reroute	**	**	Debugging
C	Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Examples
C	Additional References - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - OSPF	**	Traffic Engineering - OSPF	
C	Restrictions - Segment Routing Traffic Engineering - OSPF	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - OSPF	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - OSPF	**	**	How to Configure
T	Verifying Configuration - SR-TE Tunnels	**	**	Verifying configuration
C	Additional References - Segment Routing Traffic Engineering - OSPF	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - OSPF	**	**	Feature Information
C	BGP Dynamic Segment Routing Traffic Engineering	**	BGP Dynamic + Traffic Engineering	

## 12. Pre-TR Framework 3: Extrapolate the un-tokenized content onto the Tokenized framework.

DTD	Topic	Primary Thesis	Secondary Thesis	Routine
C	Introduction to Segment Routing	Segment Routing	Introduction	
C	Overview - Segment Routing	**		Overview
C	How Segment Routing Works	**		How Segment Routing Works
C	Examples - Segment Routing	**		Examples
C	Benefits - Segment Routing	**		Benefits
C	Segment Routing Global Block	**		Global Block
C	Additional References - Segment Routing	**		Additional References
C	Feature Information - Introduction Segment Routing	**		Feature Information
C	Segment Routing - IS-IS v4 Node SID	**	IS-IS v4 Node SID	
C	Restrictions Segment Routing - IS-IS v4 Node SID	**	**	Restrictions
C	Information About Segment Routing IS-IS v4 Node SID	**	**	Information About
T	How to Configure Segment Routing - IS-IS v4 Node SID	**	**	How to Configure
C	Configuration Examples Segment Routing - IS-IS v4 Node SID	**	**	Configuration Examples
C	Additional References Segment Routing - IS-IS v4 Node SID	**	**	Additional references
C	Feature Information Segment Routing - IS-IS v4 Node SID	**	**	Feature Information
C	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Prerequisites - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Prerequisites
C	Information About IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
C	Additional References - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - IS-IS	**	Traffic Engineering - IS-IS	
C	Restrictions - Segment Routing Traffic Engineering IS-IS	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - IS-IS	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - IS-IS	**	**	How to Configure
C	Additional References - Segment Routing Traffic Engineering - IS-IS	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - IS-IS	**	**	Feature Information
C	Segment Routing OSPFv2 Node SID	**	OSPFv2 Node SID	
C	Information About Segment Routing - OSPFv2 Node SID	**	**	Information About
T	How to Configure Segment Routing - OSPFv2 Node SID	**	**	How to Configure
C	Additional References Segment Routing - OSPFv2 Node SID	**	**	Additional references
C	Feature Information - Segment Routing - OSPFv2 Node SID	**	**	Feature Information
C	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	
C	Restrictions - Topology Independent Loop Free Alternate Fast Reroute	**	**	Restrictions
C	Information About OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Information About
T	How to Configure Topology Independent Loop Free Alternate Fast Reroute	**	**	How to Configure
T	Debugging Topology Independent Loop Free Alternate Fast Reroute	**	**	Debugging
C	Examples: OSPFv2 Link-Protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Examples
C	Additional References - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Additional references
C	Feature Information - OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	**	**	Feature Information
C	Segment Routing Traffic Engineering - OSPF	**	Traffic Engineering - OSPF	
C	Restrictions - Segment Routing Traffic Engineering - OSPF	**	**	Restrictions
C	Information About Segment Routing Traffic Engineering - OSPF	**	**	Information About
T	How to Configure Segment Routing Traffic Engineering - OSPF	**	**	How to Configure
T	Verifying Configuration SR-TE Tunnels	**	**	Verifying configuration
C	Additional References - Segment Routing Traffic Engineering - OSPF	**	**	Additional references
C	Feature Information - Segment Routing Traffic Engineering - OSPF	**	**	Feature Information
C	BGP Dynamic Segment Routing Traffic Engineering	**	BGP Dynamic + Traffic Engineering	

13. TR Framework: A Thesis-Routine tokenized framework is derived from the initial set of DITA and DITAMAP source files. The TR Framework has information on the DTD, Primary Thesis, Secondary Thesis and Routines that are associated with all the DITA source files.

	DTD	Primary Thesis	Secondary Thesis	Routine
	C	Segment Routing	Introduction	
	C	" "		Overview
	C	" "		How Segment Routing Works
	C	" "		Examples
	C	" "		Benefits
	C	" "		Global Block
	C	" "		Additional References
	C	" "		Feature Information
	C	Segment Routing	IS-IS v4 Node SID	
	C	" "	" "	Restrictions
	C	" "	" "	Information About
	T	" "	" "	How to Configure
	C	" "	" "	Configuration Examples
	C	" "	" "	Additional references
	C	" "	" "	Feature Information
	C		IS-IS Link-protection	Topology Independent Loop Free Alternate Fast Reroute
	C		" "	Prerequisites
	C		" "	Information About
	T		" "	How to Configure
	C		" "	Additional references
	C		" "	Feature Information
	C	Segment Routing	Traffic Engineering - IS-IS	
	C	" "	" "	Restrictions
	C	" "	" "	Information About
	T	" "	" "	How to Configure
	C	" "	" "	Additional references
	C	" "	" "	Feature Information
	C	Segment Routing	OSPFv2 Node SID	
	C	" "	" "	Information About
	T	" "	" "	How to Configure
	C	" "	" "	Additional references
	C	" "	" "	Feature Information
	C		OSPFv2 Link-protection	Topology Independent Loop Free Alternate Fast Reroute
	C		" "	Restrictions
	C		" "	Information About
	T		" "	How to Configure
	T		" "	Debugging
	C		" "	Examples
	C		" "	Additional references
	C		" "	Feature Information
	C	Segment Routing	Traffic Engineering - OSPF	
	C	" "	" "	Restrictions
	C	" "	" "	Information About
	T	" "	" "	How to Configure
	T	" "	" "	Veifying configuration
	C	" "	" "	Additional references
	C	" "	" "	Feature Information
	C	Segment Routing	BGP Dynamic + Traffic Engineering	



1. The rows containing the Task DTDs are identified.
2. On the generated TR Framework, plot the 1st, 2nd and 3rd level Subroutines. In other words, the 3rd, 4th, and 5th level hierarchical topics are listed to every tokenized row that has a task DTD.

DTD	Primary Thesis	Secondary Thesis	Routine	Sub-Routines		
				1st Level Sub-Routines	2nd Level Sub-Routines	3rd Level Sub-Routines
Task	Segment Routing	IS-IS v4 NodeSID	How to Configure	Configuring Segment Routing Configuring Segment Routing on IS-IS Network Configuring Prefix-SID for IS-IS Configuring Prefix Attribute N-flag-clear Configuring Explicit Null Attribute Configuring Segment Routing Label Distribution Protocol Preference Configuring IS-IS SRMS Configuring IS-IS SRMS Client Configuring IS-IS SID Binding TLV Domain Flooding		
Task		IS-IS Link-protection Topology Independent Loop Free Alternate Fast Reroute	How to Configure	Configuring Topology Independent Loop Free Alternate Fast Reroute Configuring Topology Independent Loop Free Alternate With Mapping Server Verifying the Tiebreaker Verifying the Primary and Repair Paths Verifying the IS-IS Segment Routing Configuration Verifying the IS-IS Topology Independent Loop Free Alternate Tunnels Verifying the Segment Routing Traffic Engineering With Topology Independent Loop Free Alternate Configuration		
Task	Segment Routing	Traffic Engineering - IS-IS	How to Configure	Configuring Path Option for a TE Tunnel Configuring SR Explicit Path Hops Configuring Affinity on an Interface Enabling Verbatim Path Support Verifying Configuration of the SR-TE Tunnels Verifying Verbatim Path Support		
Task	Segment Routing	OSPFv2 NodeSID	How to Configure	Configuring Segment Routing With OSPF Configuring Segment Routing on OSPF Network Configuring Prefix-SID for OSPF Configuring Prefix Attribute N-flag-clear Configuring Explicit Null Attribute With OSPF Configuring Segment Routing Label Distribution Protocol Preference With OSPF Configuring OSPF SRMS Configuring OSPF SRMS Client		
Task		OSPFv2 Link-protection Topology Independent Loop Free Alternate Fast Reroute	How to Configure Debugging	Enabling Topology Independent Loop Free Alternate Fast Reroute Configuring Topology Independent Loop Free Alternate Fast Reroute Configuring Topology Independent Fast Reroute Tie-breaker Verifying Topology Independent Fast Reroute Tunnels Debugging Topology Independent Loop Free Alternate Fast Reroute		

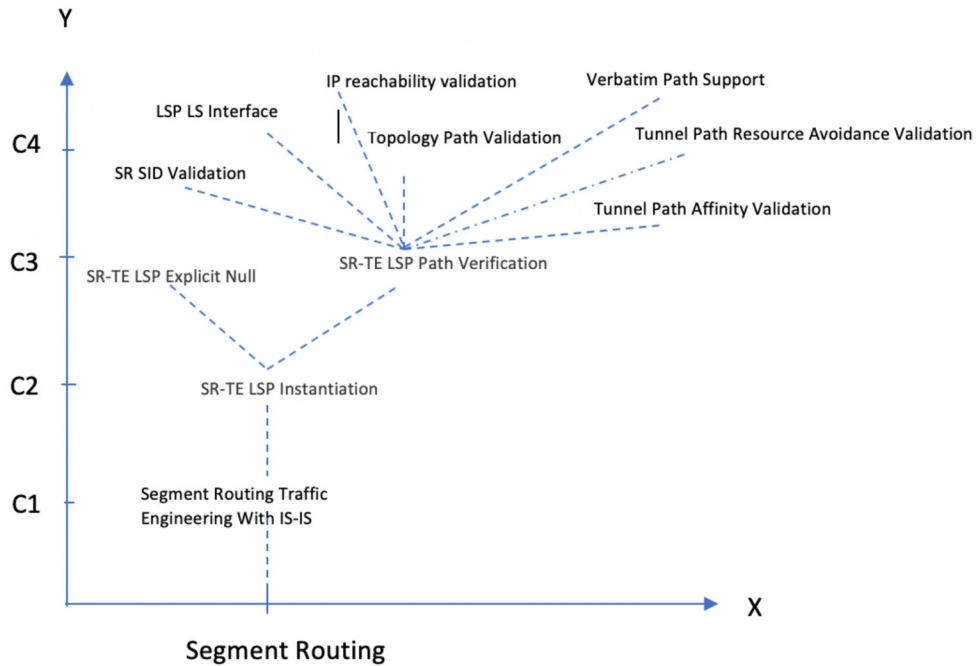
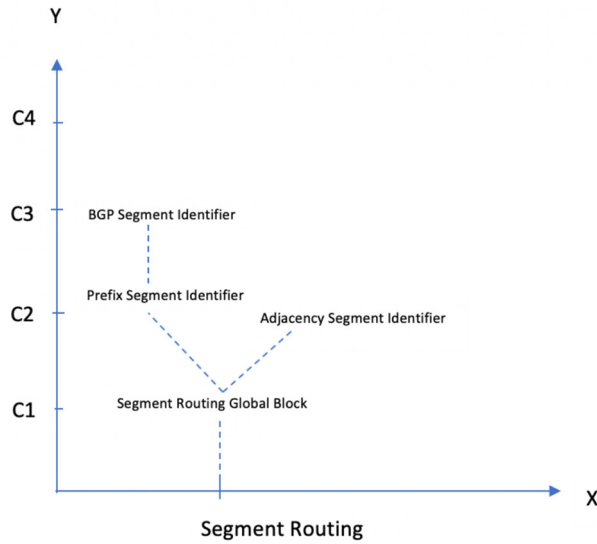
A tokenized information set from the DITA source files is generated in this step.

Part 2: Derived relationships (Creating a Domain Ontology)

1. A tokenized information set is derived using the Thesis-Routine Matrix.
2. A set of Procedural information is derived from the Task DTD source files. For example, the terms Installing, Configuring, Troubleshooting, Resolving, Setting up, and so on.
3. A set of domain specific information is derived from the Concept DTD source files.
  - a. Relations across Concept DTD files are derived by nesting the DITA files by their hierarchy in the DITAMAP - The following relations are mapped. All the following relations apply for the Thesis – Segment Routing.

Nesting Level	Topic
Concept 1	Segment Routing Global Block
Concept 2	Adjacency Segment Identifiers
Concept 2	Prefix Segment Identifiers
Concept 3	BGP Prefix Segment Identifiers
Nesting Level	Topic
Concept 1	Segment Routing With IS-IS v4 Node SID
Concept 2	Segment Routing Adjacency SID Advertisement
Concept 3	Multiple Adjacency-SIDs
Concept 2	Segment Routing Mapping Server
Concept 3	Connected Prefix SIDs
Concept 2	SRGB Range Changes
Concept 3	SRGB Deletion
Nesting Level	Topic
Concept 1	Segment Routing Traffic Engineering With IS-IS
Concept 2	SR-TE LSP Instantiation
Concept 3	SR-TE LSP Explicit Null
Concept 3	SR-TE LSP Path Verification
Concept 4	Topology Path Validation
Concept 4	SR SID Validation
Concept 4	LSP Egress Interface
Concept 4	IP Reachability Validation
Concept 4	Tunnel Path Affinity Validation
Concept 4	Tunnel Path Resource Avoidance Validation
Concept 4	Verbatim Path Support

- b. The mapped concepts are depicted using an Inverted Disclosure Plot. This has the nesting level information on the Y-axis and the Feature related information on the X-axis. The disclosure plot provides a graphical representation of how the various entities, their sub-entities (classes and sub classes) are related with each other. Using the Inverted Disclosure Plot method, two fundamental concepts in Segment Routing can be depicted using the following graphs:



- c. The relations between these plotted concepts can thus be represented as simple ratios. For example, the following ratios can be arrived at from the Inverted Disclosure Plots.

Concept 1	Concept 2	Relation
Segment Routing Global Block	Adjacency Segment Identifiers	1:2
Segment Routing Global Block	Prefix Segment Identifiers	1:2
Segment Routing Global Block	BGP Prefix Segment Identifiers	1:3

Concept 1	Concept 2	Relation
Segment Routing Traffic Engineering With IS-IS	SR-TE LSP Instantiation	1:2
Segment Routing Traffic Engineering With IS-IS	SR-TE LSP Explicit Null	1:3
Segment Routing Traffic Engineering With IS-IS	SR-TE LSP Path Verification	1:3
Segment Routing Traffic Engineering With IS-IS	Topology Path Validation	1:4
Segment Routing Traffic Engineering With IS-IS	SR SID Validation	1:4
SR-TE LSP Path Verification	SR SID Validation	1:2

- d. The plotted concepts are evaluated in a Weightage Matrix. A threshold value is assigned for concepts that are recurring across products. A threshold value would ensure that domain concepts and sub-concepts are recurring and valid across the entire domain.

Concept and sub-concepts	Occurs in Product A	Occurs in Product B	Occurs in Product C	Weightage
Segment Routing Global Block – Adjacency Segment Identifiers	30	30	30	90
Segment Routing Global Block – BGP Segment Identifier	30	30	0	60

The following classes and sub-classes are derived from this step:

A set of **Derived Relationships** are arrived from this step.

Part 3: Extracted Relationships

A Chronology of the product features, its closed and open caveats/bugs, the new and modified software features, the new and modified hardware features are all plotted and diagrammatically listed as shown in the following image.

This information is extracted from the Release Notes documents, and are listed chronologically, for every product release.

	New & Changed Information	New Software Features	Modified Software Features	New Hardware Features
cBR 16.6.x		BFS QAM Configuration Expanded GQI Protocol Support Remote PHY DOCSIS 3.1 OFDM Channel Configuration Capped License Enforcement Dynamic Multicast Replication Session Remote PHY PowerKey VOD DOCSIS 3.1 Upstream DOCSIS 3.1 Downstream Resiliency for OFDM Channel D3.1: Multiple OFDM channels per port: 16 per LC	Lawful Intercept Cisco Remote PHY Out-of-Band	
cBR 16.7.x	Cisco cBR-8 Converged Cable Access Router Supervisor 250	Configurable DOCSIS CMTS Capabilities DHCPv6 F Dynamic Bonding Group Voltage Thresholds for AC Power Supply Module Mo Configurable Tilt adjustment for all channels on a por RPHY IPV6 Support ISSU I-CCAP Upgrade Across Major Releases RPHY and ICMTS Mixed mode support Time and Frequency Division Multiplexing (TaFDM) Support Network Configuration Protocol Enabling IOx on Cisco cBR Remote PHY DVB Video on Demand Remote PHY Switched Digital Video	512 RPD per Chassis SG Based Config (OpSimp) Phase 2 Multicast Session OFDMA Channel Configuration Enhanceme	Cisco cBR-8 Converged Cable Access Router Supervisor 250

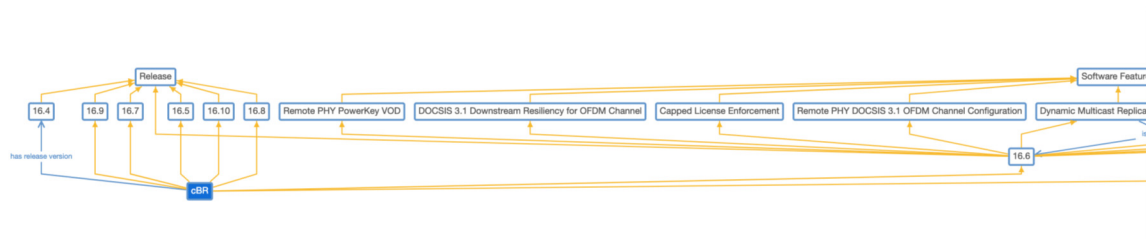
A set of **Extracted Relationships** are derived from this step.

### Part 4: Generating Relationships

Relationships are plotted for a product ontology. A simple representation is depicted through the following image.

	Releases	Features	Error Codes	Software features	Hardware Features	Modified Software	Open Bugs	Closed Bugs
Releases		Supports		New features	New Hardware	Modied Software	Unresolved bugs	Resolved Bugs
Product	Has versions	Supports	Listed error codes					
Features	is supported from							
Error Codes		has possible error scenario						
Software features	has new software							
Hardware Features	has new hardware							
Modified Software	has modified software							
Open Bugs	has unresolved bugs	related to						
Closed Bugs	resolved bugs on	related to						

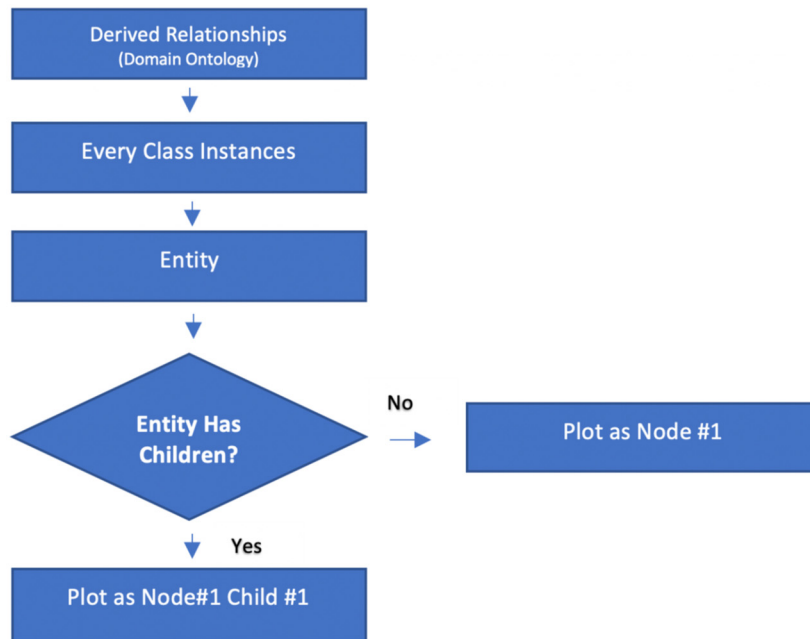
The plotted classes and relationships are diagrammatically represented as an Ontology as shown in the following image. The tool used is Protégé.



Part 5: Generating an AI Schema

The AI schema can be plotted by:

1. Copying the list of generated class instances and sub-class instances as Entities.
2. Copying the list of generated Routines as Intents.
3. Creating parent nodes and child nodes based on the relations derived from the ontology tree. This is as represented in the following flowchart.



4. The parameters in the following table is further used to create the subsequent Dialog Nodes framework structure.

Routine	Primary Thesis	Secondary Thesis	DTD	Node Relationship
✓	✓	✓	✓	Individual Node – Node #1 Child #1
✓	✓	✗	✓	Branch on Node #1, Child #2
✓	✗	✓	✓	Individual Node - Node #2
✗	✓	✓	✓	Individual Node - Node #3
✓	✓	✓	✗	Individual Node - Node #4