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The GOLEM Ontology for Narrative and Fiction

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Abstract

This paper introduces the GOLEM ontology, a novel framework designed to provide a structured and computationally tractable representation of narrative and fictional elements. Addressing limitations in existing ontologies regarding the integration of fictional entities and diverse narrative theories, our model extends CIDOC CRM and LRMoo and leverages DOLCE's cognitive foundations to provide a flexible and interoperable framework. The ontology captures complexities of narrative structure, character dynamics, and fictional worlds while supporting provenance tracking and pluralistic interpretations. The modular structure facilitates alignment with various literary and narrative theories and integration of external resources. Future work will focus on expanding domain-specific extensions, validating the model through larger-scale case studies, and developing a reader response module to systematically model the reception of narratives. By fostering interoperability between literary theory, fan cultures, and computational analysis, this ontology lays a foundation for interoperable comparative research on narrative and fiction.

Keywords: CIDOC-CRM; LRMoo; DOLCE; ontology; computational literary studies; digital humanities; literary theory; narratology; semantic web technology

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1. Introduction

1.1. Narrative Theory and Computational Literary Studies

The study of narrative has long been a central focus in literary criticism, with formalist models by Vladimir Propp and Algirdas Julien Greimas providing foundational frameworks for understanding narrative mechanisms and structures and the role of characters in stories. Traditional approaches to narrative analysis are now being complemented and expanded by computational methods, marking a significant shift in how scholars engage with narrative texts. Over the past decade, natural language processing has developed various computational techniques for analyzing narrative, including summarization, commonsense inference, and event detection, bringing an important empirical dimension to narrative studies (Piper et al. 2021). Despite these advances, there is often a disconnection between computational approaches and the rich theoretical work on narrative within the humanities, social sciences, and cognitive sciences. This gap highlights the need for more theoretically grounded computational approaches.

Translating complex literary concepts into minimal units of analysis and into computer-readable formats is challenging, but it is not too different from what narratologists and

literary theorists have tried to do. Ultimately, what is required is a formal model that can be used (operationalized) to guide the analysis of literary texts, ideally of several texts that differ from each other, so that comparisons are possible (Jacke 2025; Pichler and Reiter 2022). The Digital Humanities have begun addressing this challenge through formal conceptual modeling processes and the description of traditional concepts using declarative programming approaches—ranging from semantic markup (e.g., XML-TEI) to highly structured data models for the Semantic Web (e.g., RDF-based syntaxes) (Tomasi 2018). Nonetheless, significant obstacles remain, particularly when it comes to capturing the content of literary works:

- The first obstacle concerns the complexity of literary studies as a knowledge domain, which stems from varying interpretations of concepts across different scholarly traditions and theories. This shows the necessity of new approaches that allow us to represent the plurality of different perspectives and narrative models while at the same time making them comparable.
- The second obstacle concerns fundamental gaps that remain in how digital systems represent and process narratives. Digital libraries, especially those focused on cultural heritage, have developed rich models to describe the metadata of literary works and their cataloging, but they fail to offer services specifically addressing the content of such works (Meghini et al. 2021). This limitation creates a significant barrier to comparative narrative analysis across various texts and media forms.

The absence of standardized approaches for representing literary works and narratives in comparable formats complicates the analysis across texts, languages, and cultures. This gap highlights the need for more sophisticated ontological models that can capture the nuances of narrative across different textual traditions while facilitating computational comparison and analysis. Moreover, for this endeavor to be coherent with the humanistic values of plurality and perspectivism, a suitable representational standard should allow for the modeling of various, and even contradictory, statements about the similar units of analysis. In this article, we rely on Semantic Web technologies, which can offer an appropriate context for the development of such standards, to propose a formal model (an ontology) focused on two common aspects of literary works: narrativity (Abbott 2019) and fictionality (Zetterberg Gjerlevsen 2016).

1.2. Semantic Web Technology for Literary Studies

Formal ontologies serve as descriptive models representing domain knowledge with robust specifications that bridge the gap between human understanding and machine processing. These structured knowledge representations solve interoperability between humans and machines by enabling the representation of both resources and subject knowledge through hierarchies of classes, objects, and relationships between them. Ontologies offer significant advantages for narrative analysis by providing robust frameworks to represent complex narrative structures in computer-readable formats. When made explicit and expressed using standards like, for example, the Web Ontology Language (OWL 2), formal ontologies become highly compatible and can be linked to other ontologies. This linkability creates opportunities for integrating diverse narrative datasets and analytical frameworks.

The Linked Open Data ecosystem offers powerful capabilities for enhancing narrative analysis by connecting disparate knowledge sources through standardized mechanisms. For example, when a narrative resource identifies an author, LOD infrastructure allows systems to automatically retrieve supplementary information about that individual from multiple sources, including biographical details from DBpedia, social connections from FOAF, and geographical data from specialized repositories. The implementation of LOD principles in narrative analysis systems demonstrates this potential for enhanced interoper-

ability. For instance, the Story Maps and Beyond Visualization Tool (SMBVT) exemplifies this approach by assigning International Resource Identifiers (IRIs) to narrative events and components, primarily extracted from Wikidata. This system models narrative data in an OWL-graph representation compliant with a Narrative Ontology model, organizing stories as sub-graphs within a comprehensive story graph (Bartalesi et al. 2023). This architecture automatically connects narrative elements through shared entities and enables cross-story analysis while also facilitating connections to external knowledge bases like Europeana. The application of LOD principles also increases the value of humanities research data by making it more discoverable and reusable. The Semantic Data for Humanities and Social Sciences (SDHSS) initiative exemplifies this approach, pooling structured historical data to enable reuse across research projects through a generic conceptual model that ensures semantic interoperability (Beretta 2024). This project's integration with CIDOC CRM demonstrates how domain-specific narrative data can be aligned with established standards, facilitating broader sharing and discovery.

The CIDOC Conceptual Reference Model (CIDOC CRM) stands as the predominant ontology for cultural heritage data modeling, having achieved ISO standard status (ISO 2023) and widespread adoption across museums, libraries, and archives (Sanfilippo et al. 2020). This event-centric ontology conceptualizes data as occurrences or outcomes of events, capturing interactions between actors and objects across time and space (Doerr 2003; Doerr and Iorizzo 2008; Meghini and Doerr 2018). CIDOC CRM's design specifically accommodates multiple alternative propositions about entities, making it both a theoretical framework and a practical tool for cultural heritage data integration. The ontology's prominence has led to its extension and integration with other frameworks. The harmonization with FRBR (Functional Requirements for Bibliographic Records)—now LRMoo—incorporates fundamental notions for modeling text, such as expressions and expression fragments (Meghini et al. 2021). Additionally, CIDOC CRM serves as a foundation for domain-specific extensions like those developed for intangible cultural heritage projects (Huang and Xu 2022). The challenge in ontology development for narratives involves balancing domain-specific needs with standardization and interoperability. Cross-mapping specialized ontologies to reference models like CIDOC CRM increases their usefulness by enabling interoperability with related systems. This approach provides a foundation for capturing the semantic richness of narratives while benefiting from the structured representation CIDOC CRM offers.

Despite these strengths in addressing the first obstacle identified in Section 1.1, CIDOC CRM and its extensions do not address the second obstacle, that of modeling the content of narratives and fiction. In response to these gaps, specialized narrative ontologies have emerged.

2. Related Works

Various ontologies for narrative have been developed over the years, as reviewed by Varadarajan and Dutta (2021). Some of these ontologies, such as the Storytelling Ontology Model (Nakasone and Ishizuka 2006), the Fabula Model (Swartjes and Theune 2006), and Narrative Ontology (NOnt) (Meghini et al. 2021), aim to provide a general representation of narratives independent from specific narrative domains. Others focus on more specific narrative domains, such as Drammar (Damiano et al. 2019) and ProppOntology (Pannach et al. 2021). In this section, we analyze both domain-independent and domain-specific narrative ontologies to compare their coverage of narrative concepts, assess their interoperability, particularly whether they reuse existing ontologies, and identify potential gaps in current models. A summary of the ontologies compared is provided in Table 1.

Table 1. List of major narrative ontologies for narrative and fiction.

Ontology	Narrative Domain	Narrative Concepts	Design Language	Ontology Alignment
Storytelling Ontology Model (Nakasone and Ishizuka 2006)	General	Event, act, scene, agent, role, agent's role	OWL	No
OntoMedia (Jewell et al. 2005)	General	Entity (e.g., characters, objects), entity traits, events	OWL	No
The Fabula Model (Swartjes and Theune 2006)	General	Character, character's goal, action, character's mental state, perception, event	OWL	No
Character Ontology (Hastings and Schulz 2019)	General	Character, character features	OWL	BFO
Narrative Ontology (NOnt) (Meghini et al. 2021)	General	Narrative, fabula events, narration, reference	OWL	CIDOC CRM, FRBRoo, OWL Time, DOLCE
Circumstantial Event Ontology (Segers et al. 2018), (Vossen et al. 2021)	General	Event, agent, situation	OWL	SUMO
Drammar ontology (Damiano et al. 2019)	Drama	Endurant (agent, object), perdurant (action, event), mental state	OWL	DOLCE
Archetype Ontology (Damiano et al. 2013)	Artworks	Archetypes, character, object, event, action, setting	OWL	FRBRoo
ProppOnto (Peinado et al. 2004)	Folktale	Character, setting, narrative function	OWL	No
ProppOntology (Pannach et al. 2021)	Folktale	Narrative function, character, character's role	OWL	No

2.1. Domain-Independent Narrative Ontologies

The Storytelling Ontology Model (Nakasone and Ishizuka 2006) is a structured model that defines concepts, relationships, and rules for organizing storytelling elements. It is based on Rhetorical Structure Theory (RST) (Mann and Thompson 1987), a widespread framework that analyzes text by establishing hierarchical relationships between a main idea (nucleus) and its supporting information (satellites) to ensure coherence. The ontology consists of several key components: concept, which defines the central topic of a story; event, a meaningful narrative unit that represents a significant moment; relation, which links events using rhetorical functions; act, the smallest structured storytelling unit that organizes events and relations; scene, a collection of acts grouped under a single concept; agent, a character or entity participating in events; and role, which defines an agent's function, such as informing, questioning, or convincing. Limitations acknowledged by the authors concern the definition of the act class, which is constrained to textual narrative and

may not be easily extended to other media, and the absence of a module for the location of narrative events.

OntoMedia (Jewell et al. 2005; Tuffield et al. 2006) is a Narrative Ontology for annotating multimedia documents with semantically rich, machine-readable metadata. This approach helps address the challenge of managing the vast amount of heterogeneous data available across the internet in various formats. The ontology consists of two primary classes: entities and events. Entities represent elements that participate in events or form the media's content, encompassing both physical (e.g., characters, objects) and abstract (e.g., language, culture) elements. These entities are characterized by traits such as personal information (e.g., age, faith), physical characteristics (e.g., building marks), state-based attributes (e.g., being, form), and motivation that describes the goals or desires driving an entity's actions. Events are interactions between entities, which can be either instantaneous (happening at a specific moment) or continuous (occurring over a period of time). Events have preconditions and postconditions, and they can be linked through causal relationships to form event chains. Each event is situated within a temporal context, specified by Terminus Ante Quem (TAQ) and Terminus Post Quem (TPQ), which define the event's start and end points within the media. Having a minimal number of broad classes and properties, the OntoMedia ontology is designed to be flexible and extensible, capable of supporting a wide range of media formats and content types, whether factual or fictional. Its potential applications include use in fields such as comparative mythology and film analysis, but the limitation is that it is not yet mapped to a standard ontology like CIDOC CRM.

The Fabula Model (Swartjes and Theune 2006) aims to provide an explicit structure for the fabula—the chronological order of the narrated events—which is crucial for generating coherent and structured narratives. The ontology defines six key fabula elements: goal, which represents a character's drive to attain, maintain, leave, or avoid something; action, which is a goal-driven, intentional change in the world; outcome, a mental concept that reflects whether a character believes their goal has been achieved; event, which refers to any change in the world that is not directly caused by a character's action; perception, which denotes what a character perceives in the story world; and internal element, which encompasses the cognitive, emotional, and belief-based processes within a character. Additionally, the model defines four types of causal relationships between these fabula elements: physical causality, the strongest form, which describes direct cause-and-effect relationships in the story world; motivation, which refers to intentional causality, where elements like goals and internal elements drive actions; psychological causality, which involves cognitive and emotional processes, such as perception leading to belief, which then motivates a goal; and enablement, the weakest form of causality, where certain conditions allow an action or event to occur. The Fabula Model is quite specific in the definition of the relationship between characters and events, but a shortcoming is that to be used, it requires the analysis of a narrative according to the available fabula elements and causal relationships. No other ways of linking characters, events, and linguistic expression are possible.

The Character ontology pattern (Hastings and Schulz 2019) offers a structured approach for modeling fictional characters and their attributes. Their method builds on the Basic Formal Ontology (BFO) and extends it using the concept of "aboutness" (Ceusters and Smith 2015), which is the relationship between information entities and what they represent. However, because BFO is designed for real-world entities, it does not fully accommodate fictional characters, which lack material existence. To address this limitation, the authors incorporate insights from fictional realism, particularly Meinong's theory of objects (Meinong 1904), which conceptualizes fictional entities as bundles of properties without actual existence. As a solution, they introduce the as-if-about-only construct, a property that links fictional characters to their attributed properties without implying

their real-world existence. A limitation of the Character ontology is that it only addresses the issue of fictional characters, defaulting to the realistic BFO for modeling other elements of a narrative (Scotti et al. 2025).

The Narrative Ontology (NOnt) (Meghini et al. 2021) is a formal model designed to represent narratives in digital libraries. To define the core components of a narrative, the authors draw on both classical and modern narratological theories (Bartalesi et al. 2016; Meghini et al. 2021). They incorporate insights from Russian Formalism (Shklovsky et al. 1917) and Bal's narratology (Bal 1997). In NOnt, the key concept is that of narrative, a story told by a narrator that presents a point of view and reflects real or fictional events. The class fabula represents the chronological sequence of events as they occur in reality or fiction. Events are defined as coherent phenomena occurring in space and time, involving participating entities such as people and objects. Events are linked through different types of relationships, including mereological relations (part–whole relationships), temporal occurrence relations (to order events in time), and causal dependency relations (to establish cause–effect links between events). Another key concept is that of narration, which refers to different ways of expressing the fabula across various languages and media. Each narration consists of a narrator, narration content (e.g., text, audio, or other media), and its specific mode of presentation. The final key concept is that of reference, which links narrative fragments to events in the fabula, enabling the reconstruction of the plot (syuzhet). To ensure semantic interoperability, NOnt integrates several existing ontologies and standards, including CIDOC CRM, FRBRoo, OWL Time, and DOLCE. NOnt is the most reusable and interoperable ontology for narrative, but it does not sufficiently address the relations between characters and events, nor does it address potential issues that may arise with the modeling of fictional entities, since it relies on CIDOC CRM's actor class, which posits that individuals "have the potential to perform intentional actions of kinds for which they can be held responsible". This is obviously problematic for fictional characters, who cannot be held accountable for their actions.

Vossen et al. (2021) present a formal model for extracting storylines from narratives, applicable mainly to news data but also more generally to both real and fictional events. They introduce the concepts of timeline, causeline, and storyline as measurable and quantifiable properties of events. Their approach draws from narratological theory, specifically the notions of fabula (how things happen), syuzhet or plot (why things happen), and plot structure. A plot structure is a complex narrative framework composed of three key elements: exposition (the introduction of actors and settings), predicament (a set of challenges that includes rising action, climax, and falling action), and extrication (the resolution or ending of the predicament). These narratological elements correspond to the three data structures in their model: timelines (fabula), which represent the chronological order of events; causelines (syuzhet), which capture the causal relationships between events; and storylines (plot structure), which integrate both chronological and causal elements to form a coherent narrative structure. This model builds upon their previous work, the Circumstantial Event Ontology (CEO) (Segers et al. 2018), which is designed to capture the causal and circumstantial relationships between events in narratives. CEO is interoperable with existing frameworks and ontologies, including FrameNet and SUMO. The advantage of this model is that it allows one to compare storylines of similar events across different texts, but the main shortcoming is that only some events are taken into account to create a storyline (Visser Solissa et al. 2025).

2.2. Domain-Specific Narrative Ontologies

The Drammar ontology (Cataldi et al. 2011; Damiano et al. 2019) is a formal framework designed to capture the essential elements of drama in a machine-readable format, facilitat-

ing the analysis and annotation of dramatic works across various media and languages. The ontology focuses primarily on characters and plot, aligning with DOLCE and drawing from the BDI (Belief, Desire, Intention) model (Bratman 1987) to represent characters' goals, beliefs, emotions, and mental states. It is structured into four top-level classes. DramaEntity encompasses drama-specific elements such as characters, actions, and states. It branches into DramaPerdurant, which includes processes and states, and DramaEndurant, which covers agents and objects. Actions are identified based on their temporal nature (perdurants) and intentionality. MentalState plays a crucial role in defining characters' internal states, including beliefs, goals, emotions, and values, all of which drive their actions. DataStructure organizes elements into structured formats such as lists, sets, and trees, ensuring coherent relationships within drama representation. DescriptionTemplate provides predefined patterns for representing instantiated drama using role-specific templates, contributing to structured storytelling. Finally, ExternalReference connects drama-related descriptions to external linguistic and commonsense knowledge, linking dramatic concepts to broader information sources. A shortcoming of the Drammar ontology is that no solution is provided for characters' physical attributes and appearance, something that is quite valuable for many readers.

The Archetype Ontology (AO) is designed to identify potential relationships between archetypes and the implicit narrative elements present in various forms of artwork (Damiano et al. 2013). The AO is structured around several key classes that categorize and connect narrative content. One of the core concepts is archetypes, which represent thematic narrative structures or core stories (e.g., labyrinth, hero). Another key concept is the artifact, which refers to the media objects (e.g., images, videos) that convey a narrative. These artifacts are aligned with the FRBRoo model, which classifies media resources into levels, including work, expression, manifestation, and item. The ontology also includes the dynamics class—derived from the Drammar ontology (Cataldi et al. 2011)—which represents actions, processes, and states within a story. This class is further divided into subclasses like action and event. Action refers to dynamic narrative events involving characters, while event encompasses narrative occurrences that do not directly involve character action but still contribute to the progression of the story. The AO defines the entity class as representing various narrative roles within a story, including characters, objects, and environments. An agent is a character or being that actively participates in the story, while an object is an item or artifact involved in the narrative. The environment represents the setting or location where the story takes place. The geographical place and temporal collocation classes are used to represent the spatial and temporal aspects of the stories and artifacts. Finally, the story class refers to a collection of interconnected actions, events, and characters that form a cohesive narrative. Stories can be categorized into specific types, such as MythologicalStory.

ProppOnto (Peinado et al. 2004) is an ontology developed for generating fairy tale plots based on Vladimir Propp's morphology of folk tales (Propp 1968), which identifies a set of recurring character functions that structure a plot. The ontology uses Propp's character functions (e.g., hero, villain, donor) as fundamental building blocks of the plot. It also incorporates background knowledge, including concepts such as character attributes (e.g., age, sex) and settings (e.g., indoors, outdoors). Additionally, the ontology models the temporal sequence of events and the dependencies between different character functions. An improved version of this ontology is ProppOntology (Pannach et al. 2021). It features two main classes: Proppian functions, which encompass categories from Propp's theory like preparation, struggle, etc., and dramatis personae, which represents characters' roles, such as heroes, villains, donors, and victims. The ontology also captures the relationships between characters and functions.

2.3. State of the Art of Narrative Ontologies

Both the domain-independent and domain-specific ontologies described above share several common elements. Most of these ontologies emphasize the central role of events in narrative construction, drawing from various narratological theories. A common feature is the incorporation of temporal components to structure the flow of events. For instance, OntoMedia (Jewell et al. 2005) models the start and end points of events, while some ontologies focus on the chronological order of events, such as the Fabula Model (Swartjes and Theune 2006). Many ontologies also address the causal relationships between events, including the Fabula Model, NOnt (Meghini et al. 2021), the Drammar ontology (Damiano et al. 2019), and CEO (Segers et al. 2018). A few ontologies go further by explicitly considering both fabula and syuzhet, including NOnt and the CEO. Another common aspect across many ontologies is the distinction between agents and non-agents, which also helps differentiate between action and event. Some ontologies also emphasize the roles and functions of characters or entities within the narrative, such as the ProppOntology (Pannach et al. 2021), the Drammar ontology, and the Archetype Ontology (Damiano et al. 2013). Furthermore, several ontologies, such as NOnt (Meghini et al. 2021) and the Archetype Ontology, are designed to be extensible and ensure semantic interoperability with other existing frameworks. This extensibility allows them to be integrated into broader applications and systems.

However, despite these efforts, no single ontology has yet managed to integrate all the core concepts of narratology and literary theory, such as characters, relationships, events, and their interrelations, into one model compatible with different literary and narrative theories, supporting the modeling of narratives in various media and accounting for the difference between real and fictional entities. There remains a gap in creating a reference ontology for narrative and fiction that can be reused across different narrative domains and applications, enabling a more comprehensive and interoperable approach to narrative representation. The GOLEM ontology for narrative and fiction aims at filling this gap.

3. Methodology

3.1. Implementation Steps

Our methodology was inspired by the approach for knowledge organization and representation in Digital Humanities projects, as outlined by Tomasi (2020). We structured our process into five key steps, integrating both a theory-driven approach, grounded in literary theory and narratology, and a bottom-up approach, informed by user-generated categorizations in fan databases and folksonomies. This dual perspective ensures that our ontology captures both the elements of narrative and fiction recognized by academic experts and those valued by broader reading communities.

1. Step 1: Defining the domain and selecting cultural objects.
   We began by defining our domain of interest—narrative and fiction—and selecting a representative set of cultural objects. These included literary works and fanfiction, with a particular focus on Archive of Our Own (AO3) fanfiction as an initial dataset. The complexity of fanfiction, which involves intertextuality, character reinterpretation, and variations in setting and plot, provided a challenging yet valuable testbed for our ontology.
2. Step 2: Conceptual modeling.
   We developed multiple models to capture the structure and features of narrative texts. First, we created a conceptual map based on real data, identifying recurring elements in existing metadata and annotations. Next, we constructed a theoretical model informed by literary theory and fan wikis, incorporating key concepts from narratology to ensure that the ontology aligns with established scholarly frameworks. Given the importance of scholarly debate and perspectivism in humanistic research,

we focused on concepts that are broad enough and sufficiently expressive to serve theories based on different epistemological assumptions and definitions of key concepts (Passalacqua and Pianzola 2016).

3. Step 3: Metadata retrieval and gap analysis.
   To populate the ontology with meaningful data, we retrieved metadata for the selected cultural objects. This process involved addressing gaps in traditional library cataloging systems, fan archives, and fan wikis. By examining these diverse sources, we ensured that our ontology supports both formal cataloging standards and community-driven categorizations.
4. Step 4: Schema alignment and data standardization.
   To enhance data interoperability and reusability, we aligned the Archive of Our Own (AO3) metadata schema with international standards. Specifically, we referred to the Work, Expression, Manifestation, Item (WEMI) structure from the Library Reference Model (LRM) to manage different aspects of narratives, fictional entities, and their relations with media franchises. Furthermore, we reused ontology design patterns from foundational ontologies such as DOLCE and domain-specific standards like CIDOC-CRM, ensuring compatibility with established semantic frameworks.
5. Step 5: Ontology construction and evaluation.
   The final step involved creating an integrated conceptual model that merges real-world metadata with our theoretical framework. Our ontology balances generality and specificity by selecting only classes broad enough to cover multiple domains while expressing the core components of narrative and fiction. Instead of introducing numerous highly specific classes (e.g., for literary genres or character taxonomies), we adopted the CIDOC-CRM E55_Type pattern. This approach allows us to handle theory-specific concepts, such as Propp's character functions, through controlled vocabularies, providing flexibility for comparative analysis. The ontology was implemented as an RDF graph, and we formulated a set of competency questions (Presutti et al. 2009) to test its representational adequacy and ensure the correctness of the data. For reasons of space, this evaluation is described in (Yang 2025). In addition, we performed a structural evaluation of the ontology using OntoMetrics[1], which provided a quantitative assessment of the model's complexity and design (see Appendix A for a selection of key metrics). We also evaluated the ontology's compliance with the FAIR principles using FOOPS![2], obtaining an overall score of 0.89.

3.2. Principles Guiding the Conceptual Modeling

The guiding principle for developing the GOLEM ontology is the reuse of ontology design patterns. Ontology design patterns serve as reusable building blocks that facilitate structured and coherent ontology design (Gangemi and Presutti 2009; Presutti et al. 2009). There are two primary approaches to reusing these patterns: analogy and extension (Ruy et al. 2017). Reuse by analogy involves identifying corresponding concepts in our domain and reproducing the structure of the pattern in the domain ontology. Reuse by extension incorporates the pattern directly into the domain ontology, allowing it to be expanded through specialization, the inclusion of new properties, and the establishment of additional relationships. In our case, we apply the extension approach. While CIDOC CRM is widely used in cultural and humanities domains, it is not sufficient to model the complexity of narratives. To address these limitations, the GOLEM ontology extends CIDOC CRM and LRMoo to the domain of narratology.

To ensure conceptual consistency and expressiveness, we align our ontology with foundational ontologies that incorporate insights from metaphysics, cognitive psychology, and linguistics. Foundational ontologies, being independent of any specific domain,

provide well-established modeling patterns that enhance coherence, logical consistency, and interoperability in domain ontology design (Guizzardi et al. 2008; Ruy et al. 2017). Among the foundational ontologies, DOLCE (Descriptive Ontology for Linguistic and Cognitive Engineering) offers the most suitable framework for our needs of modeling fictions (Scotti et al. 2025). Unlike BFO (Basic Formal Ontology) and GFO (General Formal Ontology), which impose strict ontological distinctions between different levels of reality (Mascardi et al. 2007), DOLCE adopts a "cognitive bias" that is not grounded in strictly referentialist metaphysics about the intrinsic nature of the world (Gangemi et al. 2002). Instead, it views its categories as cognitive artifacts shaped by human perception. Also, DOLCE's mesoscopic level of abstraction does not claim to offer a definitive representation of the world but rather provides a flexible, descriptive framework that is suitable for modeling narratives within fictional worlds according to different literary theories.

Modularization is another method used in our design. Given the complexity of the relationships between narrative elements, modularization is useful for achieving a more expressive and precise representation of narratological concepts. By dividing an ontology into distinct yet interlinked modules, modularization allows for a more nuanced semantic representation of each concept while maintaining coherence across the overall structure (d'Aquin 2011; d'Aquin et al. 2009). Moreover, modularization improves reusability and scalability, enabling different parts of the ontology to be adapted or integrated into other projects more efficiently (Doran 2009). A list of reused ontologies is provided in Table 2.

Table 2. List of reused ontologies and their prefixes (accessed on 21 September 2025).

Prefix	Name	URI
rdf	RDF Syntax	`http://www.w3.org/1999/02/22-rdf-syntax-ns#`
dlp	DOLCE + DnS Ultralite	`http://www.ontologydesignpatterns.org/ont/dlp/`
owl	OWL	`http://www.w3.org/2002/07/owl#`
skos	SKOS	`http://www.w3.org/2004/02/skos/core#`
schema	Schema.org	`https://schema.org/`
crm	CIDOC CRM	`http://www.cidoc-crm.org/cidoc-crm/`
lrm	IFLA LRMoo	`http://iflastandards.info/ns/lrm/lrmoo/`
gc	Golem	`https://ontology.golemlab.eu/`

3.3. Information Requirements

To effectively model narrative and fiction, our ontology must capture key structural and semantic aspects of storytelling. Over the years, several literary and narrative theories have discussed what elements are crucial for plot development and readers' sense-making (Abbott 2008; Eder et al. 2011; Gammelgaard et al. 2022). The following theory-driven requirements guided the development of our ontology:

- Fictional entities, particularly characters, often appear across different narrative representations, such as novels, film adaptations, and user-generated content like fan wikis. The ontology must support cross-media linkage, enabling the identification of entities across multiple sources while distinguishing variations in their depiction.
- Characters are defined by recognizable attributes, such as appearance, abilities, and personality traits. These features may be explicitly stated in the text or inferred from narrative descriptions and reader interpretations. The ontology must accommodate both explicit and inferred attributes while allowing for different levels of detail.
- Narratives frequently revolve around character interactions, such as friendships, rivalries, and familial ties. The ontology must model social relationships dynamically, capturing their evolution throughout a story while enabling comparative analysis across narratives.

- Characters are central to the progression of a story, engaging in key events such as battles, dialogues, or discoveries. The ontology must express character involvement in events, specifying their roles and actions within the narrative framework.
- Narrative information is typically presented in a sequence but can be reorganized according to different principles, such as chronological order. The ontology must support multiple ways of structuring events, accommodating various analytical and interpretive approaches.
- Characters and events serve specific functions within the story, such as protagonists, antagonists, or mentors. The ontology must encode these roles, drawing from established literary theories while remaining flexible enough to incorporate alternative categorizations.
- Narrative meaning is constructed through both explicit statements (e.g., "The knight is brave") and inferred details (e.g., "The knight charges into battle despite overwhelming odds"). The ontology must distinguish between direct assertions made within the text and interpretations derived from context, reader assumptions, or external analysis.
- Given the interpretive nature of narrative analysis, it is essential to document the provenance of each statement within the ontology. This includes indicating whether a claim originates from the original fiction, a secondary source (e.g., literary criticism), or user-generated content. Ensuring clear attribution enhances data reliability and facilitates comparative research across different sources and interpretations.

4. Module Overview

The GOLEM ontology includes modules for each of the following core concepts: characters, social relationships, events, settings, narrative, and inference (see Figure 1). A wiki and the complete documentation of the ontology can be found on the project's GitHub.[3] The full description of classes and properties can be found on the pyLODE-generated web page.[4]

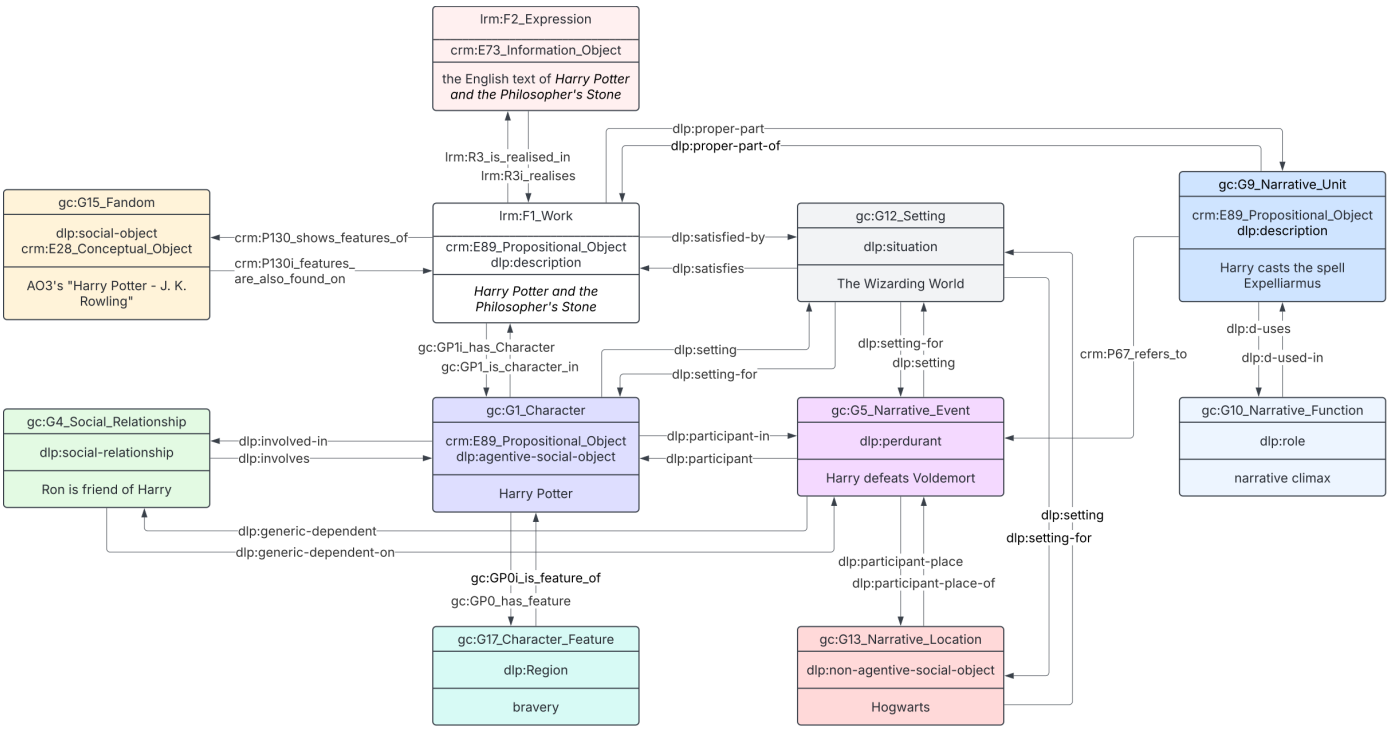

Figure 1. Core classes and properties in the GOLEM ontology.

In addition to these modules, two key concepts are work and expression, which we adopt from LRMoo, an extension of CIDOC CRM. In LRMoo, an F1_Work represents a

distinct intellectual idea conveyed through artistic and intellectual creations, such as poems, stories, or musical compositions (Riva et al. 2017; Riva and Zumer 2017). A fundamental aspect of this concept is that a work can be realized through multiple expressions. In LRMoo, an F2_Expression refers to different forms in which a work is manifested, such as texts and movies. In GOLEM, this applies to various narrative formats, such as original fiction, films, and fanfiction. Given GOLEM's initial focus on fanfiction works, we also introduce the class G15_Fandom.[5] A fandom is constituted by debates over canon and fan-produced content, self-reflective engagement of fans who project personal and collective identities onto texts, and creative reinterpretations (Booth 2018; Jenkins 2012). Accordingly, we align G15_Fandom with CIDOC CRM's E28_Conceptual_Object, as fandoms are non-material cultural entities that have become subjects of discourse regarding their identity and origins.

Within this ontology, various narrative components interact with each other. Characters appear in a work, which is realized through various media formats and is related to a particular fandom. Characters are involved in social relationships, which emerge from their shared participation in events. These events take place in narrative locations within a broader story setting. Additionally, a work is composed of narrative units that may serve distinct narrative functions. In the following sections, we zoom in these core concepts within their respective modules, exploring their foundations in narratological theory and their alignment with CIDOC CRM and DOLCE.

4.1. Character Module

"A character is a text- or media-based figure in a storyworld, usually human or human-like," understood through readers' knowledge of real people (Jannidis et al. 2009). Readers attribute to characters mental states, such as intentions and beliefs, and consider them to engage in actions. Characters can have specific functional roles within narratives, such as protagonist or antagonist, influencing how readers perceive and interpret the story. Being part of one or more works, characters are distinct from real-world individuals.

In the ontology, we introduce the class G1_Character as a subclass of the CIDOC CRM class E89_Propositional_Object. While E89_Propositional_Object encompasses immaterial entities that serve as topics of discourse that represent propositions about real or imaginary beings, this classification alone does not precisely capture the agentive nature of fictional characters. To semantically enrich the concept, we align G1_Character with DOLCE. Social objects in DOLCE are entities whose existence depends on a social and cultural community (Bottazzi and Ferrario 2009). Characters exist within narratives because they are imagined, interpreted, and understood within a shared storyworld, making them social objects. DOLCE further distinguishes between agentive and non-agentive social objects based on whether they possess intentionality. While fictional characters do not have real agency, readers attribute mental states and intentionality to them, treating them as if they do. Therefore, we align G1_Character with DOLCE's agentive-social-object class.

Conversely, non-character objects that play crucial narrative roles (e.g., a magic wand) are modeled as G16_Object, aligned with DOLCE class social-object. Depending on the context (or the specific work), these can be classified as either (more commonly) non-agentive social objects or as agentive social objects. For example, in fictional worlds, certain objects—such as the Elder Wand in The Wizarding World of Harry Potter or several magic objects in folktales—may exhibit ambiguous intentionality. G16_Object and G1_Character are not disjoint classes, so an agentive social object can be at the same time an instance of G16_Object and an instance of G1_Character.

Character features are stable aspects defining a character's identity. While CIDOC CRM provides a class for physical features (E26_Physical_Feature) and quantifiable features (E54_Dimension), it lacks a class for non-physical or qualitative features. Thus,

we create G2_Feature, with subclasses G17_Character_Feature and G18_Textual_Feature. G17_Character_Feature includes qualitative character attributes, such as biographical (e.g., birth, death), physical (e.g., hair color, scars), and psychological features (e.g., mental states, personality traits), while G18_Textual_Feature is used for aspects like narrative focalization and point of view. G18_Textual_Feature can also be used for other stylistic aspects not related to characters. In the following section, we will focus on the discussion of character features and the possibility to align them with DOLCE.

Following classical metaphysics and the DOLCE foundational approach (Masolo et al. 2002), qualities are dependent entities whose values (called regions, and emulating a trope-theory-based approach) occupy conceptual spaces (Gärdenfors 2004). While this method is theoretically sound, its full implementation in OWL would require creating individual qualities for every attribute of every character, resulting in an excessive number of triples when dealing with large-scale datasets. To balance ontological rigor with computational tractability, we adopt the pragmatic approach of DOLCE Ultra-Lite (DUL), where entities can be directly linked to regions without explicitly introducing individual qualities.[6] Consequently, we align G2_Feature with dul:Region, treating features as values in conceptual spaces (e.g., bravery as a point in a psychological space). This approach ensures ontological alignment with a well-established foundational framework while also supporting scalability and efficient reasoning and querying. The property GP0_has_feature, defined as a specialization of dul:hasRegion, establishes the relation between entities and their features (see Figure 2).

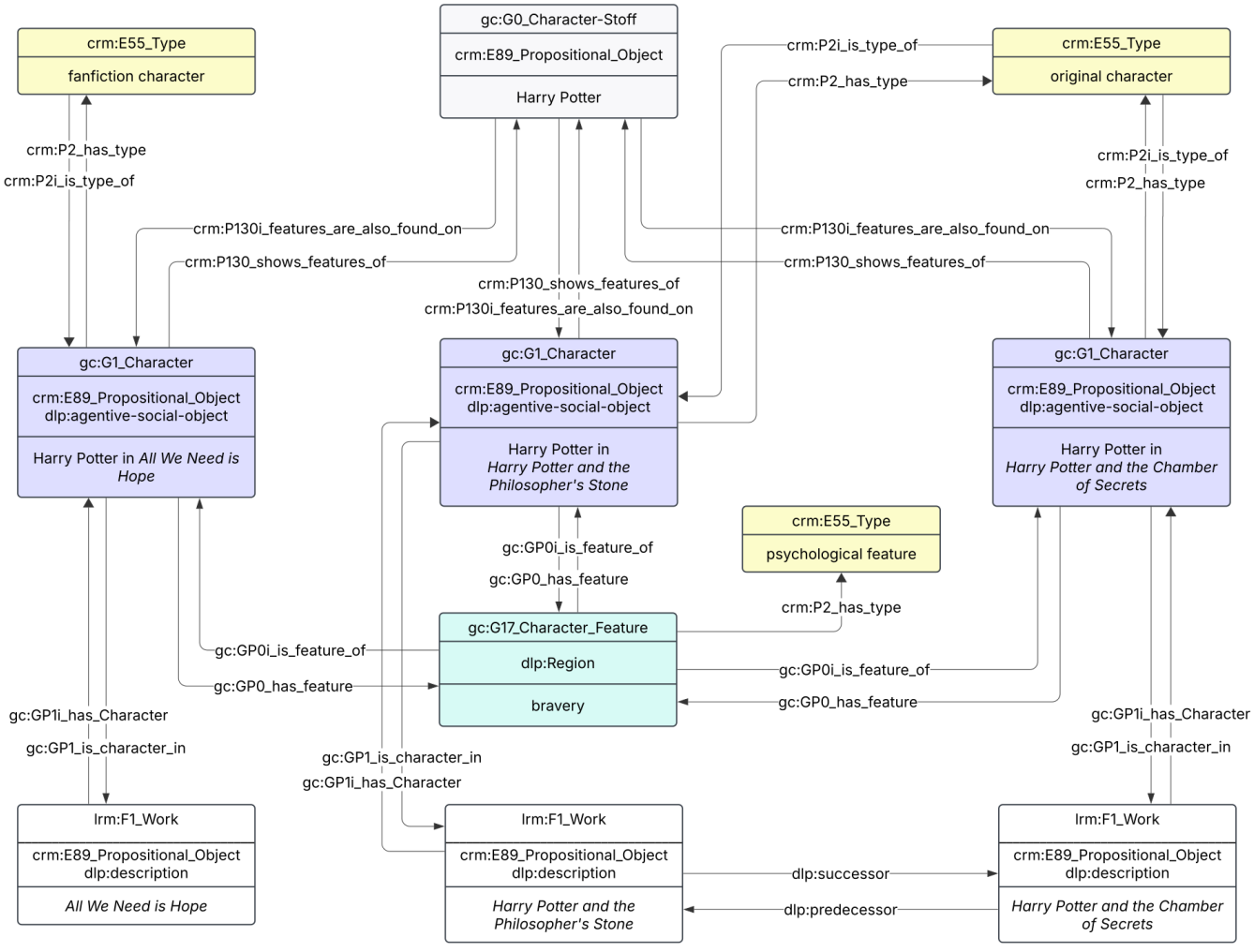

Figure 2. Character module with an example of Harry Potter in original works and fanfiction.

Lastly, we introduce the concept G0_Character-Stoff—derived from the German term Erzählstoff (narrative material) and inspired by Zgoll's theory of myths (Zgoll 2020)—to represents the infinite potential of a character across all known and unknown variations, extending beyond any singular depiction. It encompasses all possible versions, features, actions, and roles of a character across time and media while remaining open to reinterpretation and transformation. This polymorphous nature allows for endless modifications and enables us to link all variants of the same Character-Stoff into a cohesive framework. Like G1_Character, G0_Character-Stoff is also a subclass of crm:E89_Propositional_Object. However, we align it with dlp:social-object rather than dlp:agentive-social-object. This distinction arises because Character-Stoff functions as an abstract conceptual entity, aggregating all potential versions of a character rather than representing a specific or a collective agent. By using Character-Stoff, this module addresses the connection between characters and their derived forms, their appearances in various works, and their inherent features. By using the crm:P130_shows_features_of, we are able to link different variants of a character to their shared Character-Stoff, avoiding the need to link each variant individually.

4.2. Relationship Module

Social relationships refer to the connections between individuals who engage in recurring interactions that hold personal meaning for the participants (August and Rook 2013). According to Mika and Gangemi (2016), social relationships have several key characteristics, including sign, strength, provenance, history, and roles. Sign indicates whether they are positive or negative. Their strength refers to the intensity of the connection. Provenance describes how the relationship is perceived, both by those involved and by outsiders. History encompasses the sequence of events that bring the relationship into existence and shape its development over time. Roles define the specific social functions each participant assumes within the relationship.

In many ontology models, relationships and roles are not explicitly distinguished, as relationships are often represented merely as predicates linking entities, such as P97_from_father in CIDOC CRM, which does not allow one to capture the nuanced characteristics of the relationship itself. However, reifying relationships as objects rather than predicates allows for a more expressive representation. To address this, we introduce G4_Social_Relationship. A social relationship is existentially dependent on the multiple characters involved. It can be understood as a bundle of qualities that define its nature and progression over time (Gangemi and Presutti 2009; Guarino and Guizzardi 2015). For example, a romantic relationship or friendship involves qualities such as trust, commitment, and emotional closeness. In the Ontology of Descriptions and Situations (D&S), an extension of DOLCE (Gangemi and Mika 2003), a description is an entity that is conceived and recognized within a community, considered a social object. Social relationships are descriptions, as they are perceived within a given social context (Mika and Gangemi 2016). Therefore, we align G4_Social_Relationships with the D&S class social-relationship.

To model relationship roles, we introduce G6_Relationship_Role, referring to the functional role a character plays within the context of their interactions with other characters, serving as a descriptive counterpart to their enduring features. G6_Relationship_Role can be aligned with the D&S class role. The reification of relationship and role allows us to address complex relationships involving more than two characters, such as circular or triangular relationships. It divides relationships into two categories: homogeneous relationships, where all characters share the same role (such as friends), and heterogeneous relationships, where characters have distinct roles. A prime example of the latter is a love triangle, where one character may be linked to two others in different relationships, each with its own distinct role, such as "lover" and "rival".

Furthermore, relationships are inherently dynamic, evolving over time rather than being fixed or static (Chaturvedi et al. 2016). As such, this module is designed to capture the changing and evolving nature of relationships throughout a narrative, where roles may shift as the relationship progresses. As relationships are externally dependent on events that shape and transform their nature, we reuse the DOLCE predicate generically-dependent-on to link relationships to the events that contribute to their evolution.

To illustrate the evolution of relationships, we use an example in *Harry Potter and the Deathly Hallows* (Rowling 2007) (see Figure 3), where the evolving relationships between Harry, Ron, and Hermione can be modeled through a series of relationship events. Initially, at the Burrow, Harry, Ron, and Hermione demonstrate mutual support as they prepare to fight Voldemort, establishing their friendship and the role of "friend" within their relationship. As the story progresses, the relationship between Ron and Hermione begins to evolve beyond friendship. For example, during a rescue attempt, Ron's emotional breakdown and his effort to save Hermione from Bellatrix Lestrange's torture reveal the beginnings of romantic love. This shift becomes more apparent when Ron and Hermione share a kiss in their safe house after escaping from Malfoy Manor, as well as the kiss in the Chamber of Secrets. In this example, we model two primary types of relationships and their evolution: "romantic love" evolving from "friendship"[7], and the changing roles within those relationships. Ron and Hermione's friendship evolves into romantic love, where their roles shift from being "friends" to the roles of "lover" and "beloved."

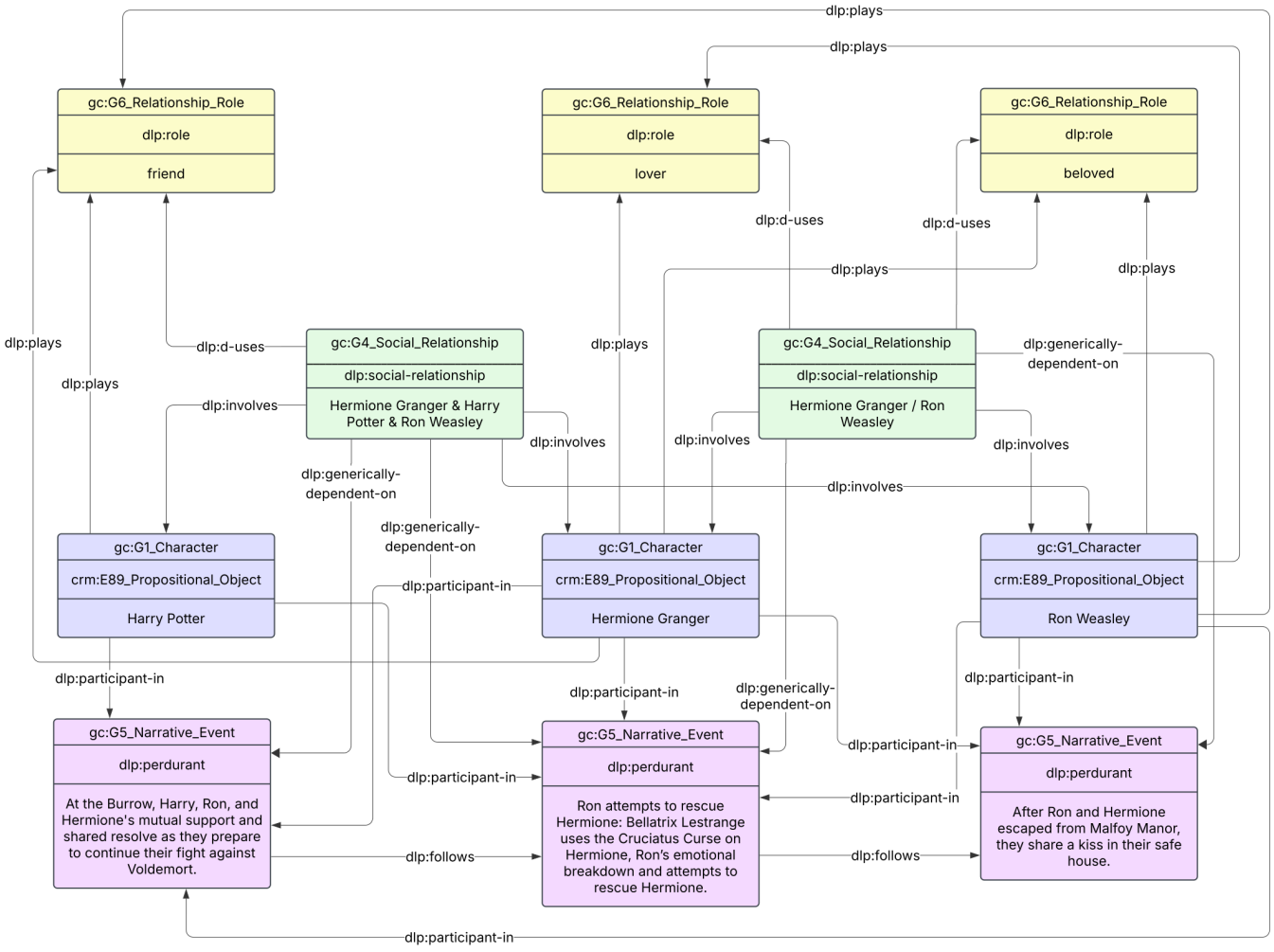

Figure 3. Relationship module illustrating the relationships between Harry, Ron, and Hermione in *Harry Potter and the Deathly Hallows* (Rowling 2007).

Therefore, by reifying relationships as entities rather than treating them as simple predicates, and by explicitly introducing the concept of roles, we establish a richer and more semantically precise framework to represent the complexities of social relationships in narratives.

4.3. Event Module

A narrative event is a unit inferred from a span of text, and it can express a change of state, a process, or a state of things that supports the story, as defined by its temporality and sequentiality. Events can be either external, like actions taken by characters, or psychological, involving changes in thoughts or feelings (Gius and Vauth 2022). Narrative events are considered perdurants, as they unfold over time but are not fully present at any given moment. Instead, they occur in distinct phases over time, see Masolo et al. (2002). Events can be either eventive, consisting of multiple smaller moments or actions, often marked by a change of state, or stative, which involve parts that endure or continue without significant change. Narrative events are distinct from psychological states that represent mental conditions or states of characters, since the latter are temporal in nature but remain relatively constant over time. Psychological states may evolve, but they are characterized by persistent qualities such as emotions, motivations, beliefs, and goals. A psychological state, thereby, is a specific type of stative occurrence.

We introduce the classes G5_Narrative_Event and G3_Psychological_State in our ontology (see Figure 4). Since CIDOC CRM does not distinguish between eventive and stative occurrences, we align our concepts with DOLCE. G5_Narrative_Event is a subclass of perdurant, while G3_Psychological_State is a subclass of state. Both characters (agentive-social-objects) and non-character objects can participate in an event, but only characters can possess psychological states. To represent participation, we use the DOLCE predicate participant.

We specify two primary types of relations between perdurants, as in Bartalesi et al. (2017): mereological relations, where a perdurant is a part of a larger, composite perdurant, and temporal occurrence relations, which connect perdurants to time intervals and define their relative ordering (e.g., whether one event occurs before, during, or after another). To represent mereological relations, we adopt the DOLCE temporal relation temporally-includes, while for temporal relations, we use follows to indicate the sequential order of events, and we use temporally-overlaps to show whether two related perdurants share common parts in time.

4.4. Setting Module

A setting is the narrative universe in which a story unfolds, encompassing the spatial, cultural, and social contexts that shape characters and events. It defines the situation and surroundings relevant to the narrative. A setting can evolve or be replaced by new settings as the story progresses. Nevertheless, a setting is linked to the whole work, not to specific events. for example, "the setting of "Eveline" by J. Joyce is early 20th-century lower-middle-class Dublin" (Ryan 2019). Defining a setting for a work is useful for its comparative and historical analysis with respect to other works. In D&S, a situation represents a structured state of affairs that satisfies a description (Gangemi and Mika 2003). Given this, we introduce the class G12_Setting and align it with the D&S class situation, as a setting provides the necessary context for a work or a narrative to unfold (see Figure 5). A situation (a context of relations between entities) is conceptualized by an observer on the basis of a descriptive context (a narrative), or, in other terms, a narrative is exemplified by (dlp:is_satisfied_by) the spatial, temporal, and social structures of the setting. Relying on Ryan's definition and aligning the concept of setting with the D&S class situation allows us

to model in-world abstract relations between entities but also external symbolic, ideological, and political meanings of narratives.

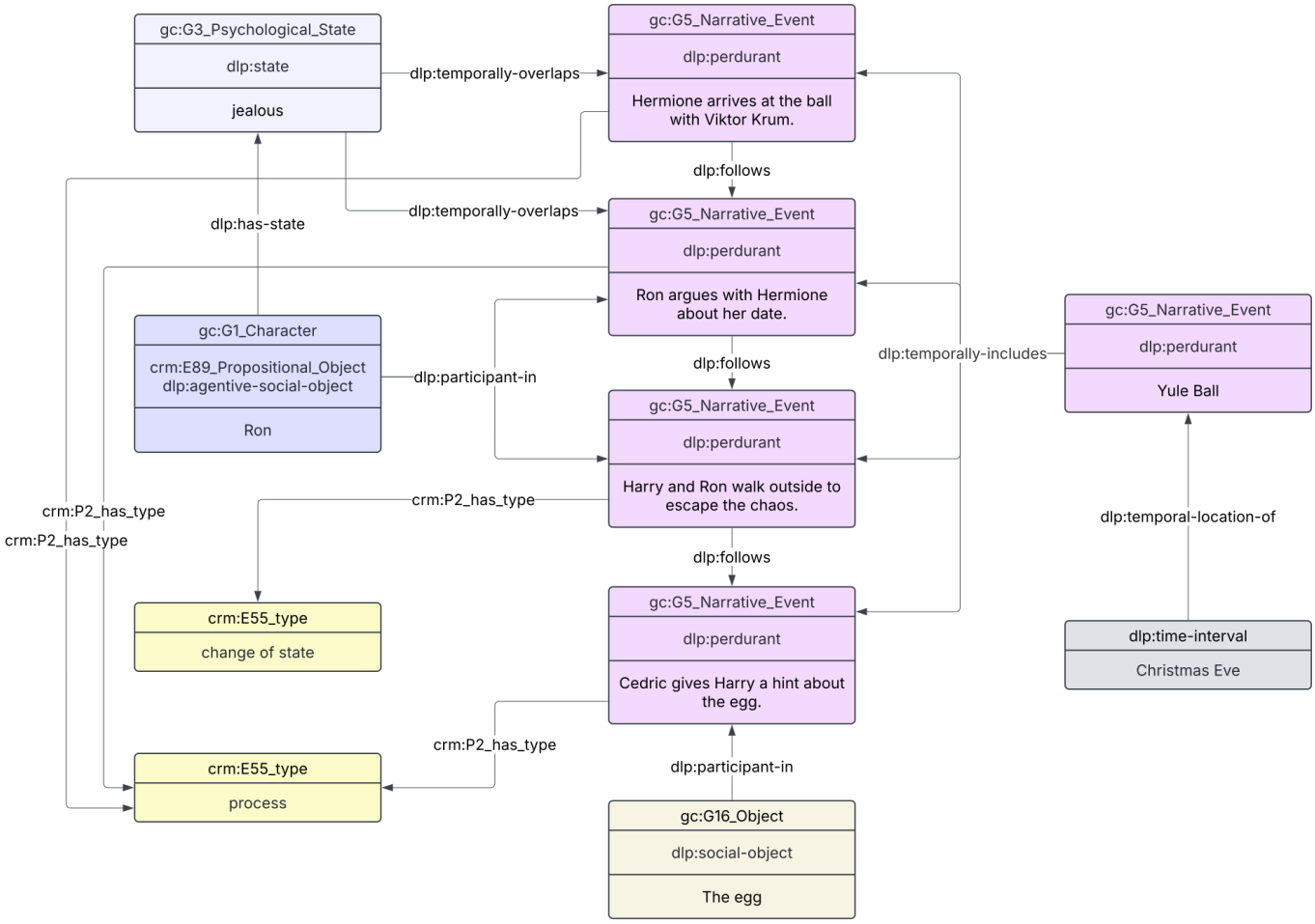

Figure 4. Event module showing the relations between events and the characters participating in them.

A setting is normally tied to the time and space of the entities in that setting. For this, we introduce the class G13_Narrative_Location, the spatial environment where events occur. Consistent with the modeling approach adopted for characters and generic objects, a narrative location is conceptualized as a social object shaped by the narrative context. A narrative location may derive features from real locations but it only exists as an entity within the narrative. As an example, "1England" in the Harry Potter series functions as a social object shaped by the narrative. We do not make any ontological distinction between "England" and, for instance, the "Forbidden Forest": although the former may exhibit features of the real-world geographical place, it is nonetheless re-contextualized by the narrative and therefore not assimilable to "England" in the actual world. Hence, in order to represent places that emerge from narrative dimensions, we align G13_Narrative_Location with the DOLCE class non-agentive-social-object.

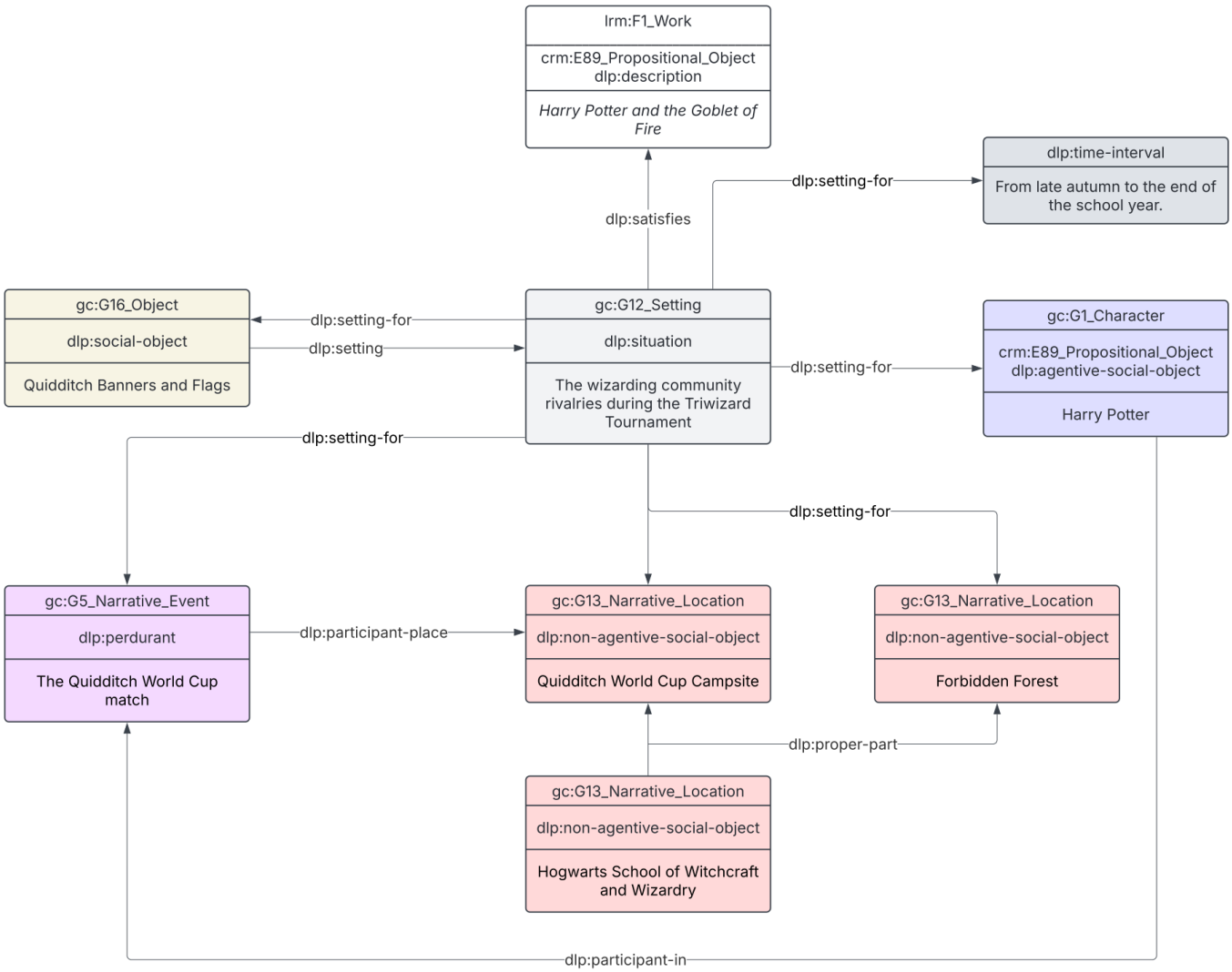

Figure 5. Setting module with an example from *Harry Potter and the Goblet of Fire* (Rowling 2000).

4.5. Narrative Module

The so-called "narrative material" (Stoffe, or Erzählstoffe) represents the fundamental units that form the basis of a narrative. It contains a chronological sequence of events (i.e., fabula) that could be manifested across various narratives and media (Zgoll 2020). In the ontology, we introduce the class G14_Narrative-Stoff for this concept as a subclass of crm:E89_Propositional_Object. It also aligns with the D&S class dlp:description. The use of G14_Narrative-Stoff allows for the representation of fundamental narrative material that can be interpreted and reinterpreted across various expressions—such as books, films, or fanfiction—while preserving the core events. This flexibility makes it easier to track how a Narrative-Stoff is adapted and reshaped.

The concept of Narrative-Stoff highlights the potential variations of narrative units within different contexts. Therefore, we introduce the class G9_Narrative_Unit, referring to the minimal or fundamental component of narrative structure that articulates actions, states, or thematic elements within a story. While events are considered the smallest unit of narrative structure (Lotman 1977), in our ontology, we distinguish between narrative units and events. The key advantage of treating narrative units as separate from events is that narrative units can be understood as propositional objects or narrative statements, whereas events are occurrences or actions in the fictional world. Narrative units articulate meaning and structure around the occurrence of events. This makes narrative units alignable with

crm:E89_Propositional_Object, representing statements about actions, states, or themes rather than the events themselves. For example, hylemes, or narrative statements (Zgoll 2020), are minimal narrative units describing in a standardized form actions, states, or information present within a narrative. An example of a narrative unit is the minimal statement "Orpheus is struck by a thunderbolt," which can refer to one or more events depending on the myth variant or media expression (Pannach 2023).

As a proper part of the narrative material, G9_Narrative_Unit is also aligned with dlp:description. By separating the narrative organization from the events, the GOLEM ontology can express relationships between events independently from how those events are sequenced or organized in the narrative. This distinction allows for more nuanced inference to be applied to both the events and the narrative organization within the model, making it a powerful tool for analyzing narrative forms and content.

G10_Narrative_Function describes the roles that narrative units play. These could be Proppian functions like "villain causes harm" (Propp 1968), but also rhetorical functions identified by literary critics for a specific work. The G11_Narrative_Role specifies the roles of characters, such as "hero" or "villain." Both G10_Narrative_Function and G11_Narrative_Role are aligned with the D&S class dlp:role, which refers to the function that a narrative unit or character assumes within a particular narrative. While the domain of G10_Narrative_Function is a narrative unit, the domain of G11_Narrative_Role is a character.

G7_Narrative_Sequence represents the organization of some narrative elements. A narrative sequence can take various forms, including sequences of functions, such as Proppian functions (Propp 1968), sequences of motifs, hylemes sequences (Zgoll 2020), temporal sequences like fabula and syuzhet, or even causelines and storylines (Vossen et al. 2021). For example, since the concept of fabula is mainly defined in relation to that of syuzhet, its conceptual function is to express a specific ordering of some narrative units. Accordingly, the fabula is a sequence of G9_Narrative_Unit that orders or sequences a set of temporal entities called events. The syuzhet, often translated as "plot" or "discourse", encompasses how events are presented and organized within a narrative (Abbott 2019; Kukkonen 2019). It involves the specific ordering and techniques used to articulate a story, reflecting the author's design and organization to achieve particular aesthetic and cognitive–emotional effects, like suspense. As for the fabula, the conceptual function of the syuzhet is to express a specific ordering of some narrative units. Accordingly, the syuzhet is also a sequence of G9_Narrative_Unit that orders a set of narrative events (Figure 6).

G7_Narrative_Sequence is aligned with the D&S class dlp:course. A course represents the structure that organizes and sequences events or actions within a situation. It defines a succession relation, indicating the order in which events or activities occur, see Gangemi and Mika (2003). While it reflects the temporal flow of events, a course is not a sequence of occurrences but a description of how these events are arranged in time. Both G10_Narrative_Function and G11_Narrative_Role have a modal target that links them to a G7_Narrative_Sequence, indicating the specific function or role the narrative unit or character fulfills within that sequence. To distinguish which role is played in which event when a character presents multiple roles in the same narrative sequence, it is necessary to specify a narrative sequence with a smaller scope. For example, in Figure 6, a sequence called "magic duel between Voldemort and Harry" could be used to specify the role of "dueler" for both characters. This model is able to distinguish between various types of G7_Narrative_Sequence (e.g., chronological order of events or presentation order), allowing for comparative analysis across different narratives. By modeling both structures separately, it enables researchers to analyze how sequences of events can be presented in multiple

ways. The example in Figure 6 shows how key events can be extracted and organized into hylemes, distinguishing between fabula and syuzhet.

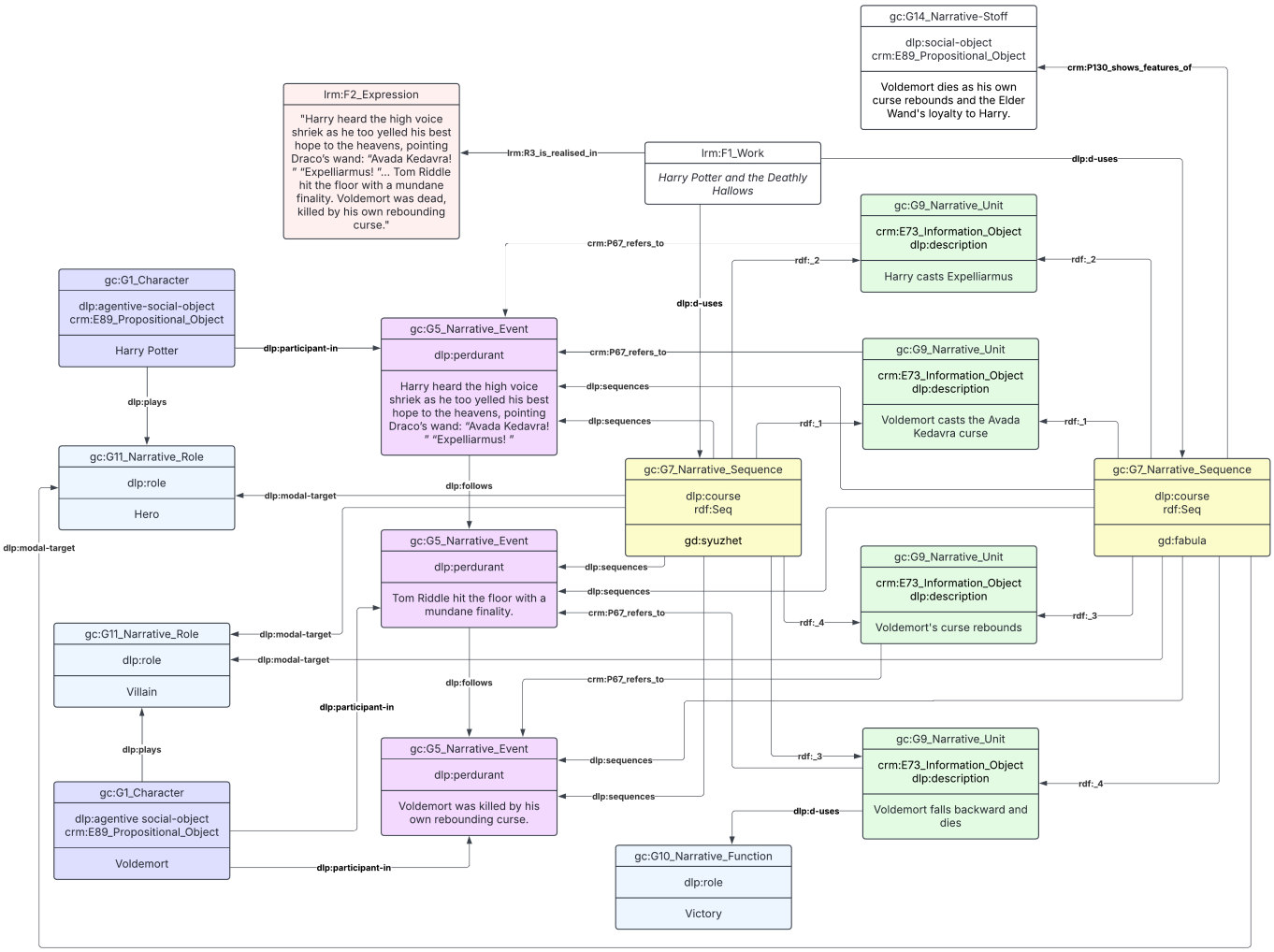

Figure 6. Narrative module with an example from *Harry Potter and the Deathly Hallows* (Rowling 2007).

4.6. Inference Module

The inference module is designed to handle the provenance of observational data, focusing on how inferences are made. By documenting the methods and sources behind each statement about a narrative, the module reflects the multiplicity of interpretations that can arise from the same source and represents how different approaches may lead to different conclusions.

Similar to other approaches (Sanfilippo et al. 2024; Schöch et al. 2022), which prioritize provenance and multi-perspectival data, the inference module captures multiple layers of scholarly analysis and interpretation. Wikidata similarly handles knowledge representation by ensuring that each statement about an entity (e.g., an author or literary work) includes detailed provenance information and reflects the perspectives that shaped it. By modeling the relationships between statements, methods, and sources, the module enhances both transparency and traceability.

To achieve this, we utilize the CIDOC CRM class E13_Attribute_Assignment to capture the attribution of properties to subjects. According to CIDOC CRM, this class represents the act of assigning a property to an object or asserting a relation between concepts (Bekiari et al. 2024). E13_Attribute_Assignment allows for detailed modeling of attribution by specifying the subject and object of the attribution, capturing the type of property being

attributed (E55_Type), as well as linking statements to their sources and methods. It also allows one E13_Attribute_Assignment to serve as the source or premise for another.

To illustrate this module (see Figure 7), we use an example from *Harry Potter and the Deathly Hallows* (Rowling 2007), modeling the inference of a "romantic relationship" between Ron Weasley and Hermione Granger based on one event: "Running at Ron, she [Hermione] flung them around their neck and kissed them full on the mouth." The inference process consists of two layers: event assignment and relationship assignment. Event assignment involves identifying and attributing the event within the text. Using E13_Attribute_Assignment, Ron and Hermione are assigned as participants in the event (the kiss), with the excerpt from the work serving as the direct source, using P16_used_specific_object. The attribute assignment is linked to the event using P140_assigned_attribute_to and to the characters involved using P141_assigned. The second layer builds upon the event assignment to infer the romantic relationship between Ron and Hermione. Another E13_Attribute_Assignment is used to establish the attribute of "romantic love" (P140_assigned_attribute_to) to the social relationship and link it to the characters (P141_assigned). The event assignment (Hermione kissing Ron) serves as the premise for this inference and is explicitly referenced as the supporting evidence.

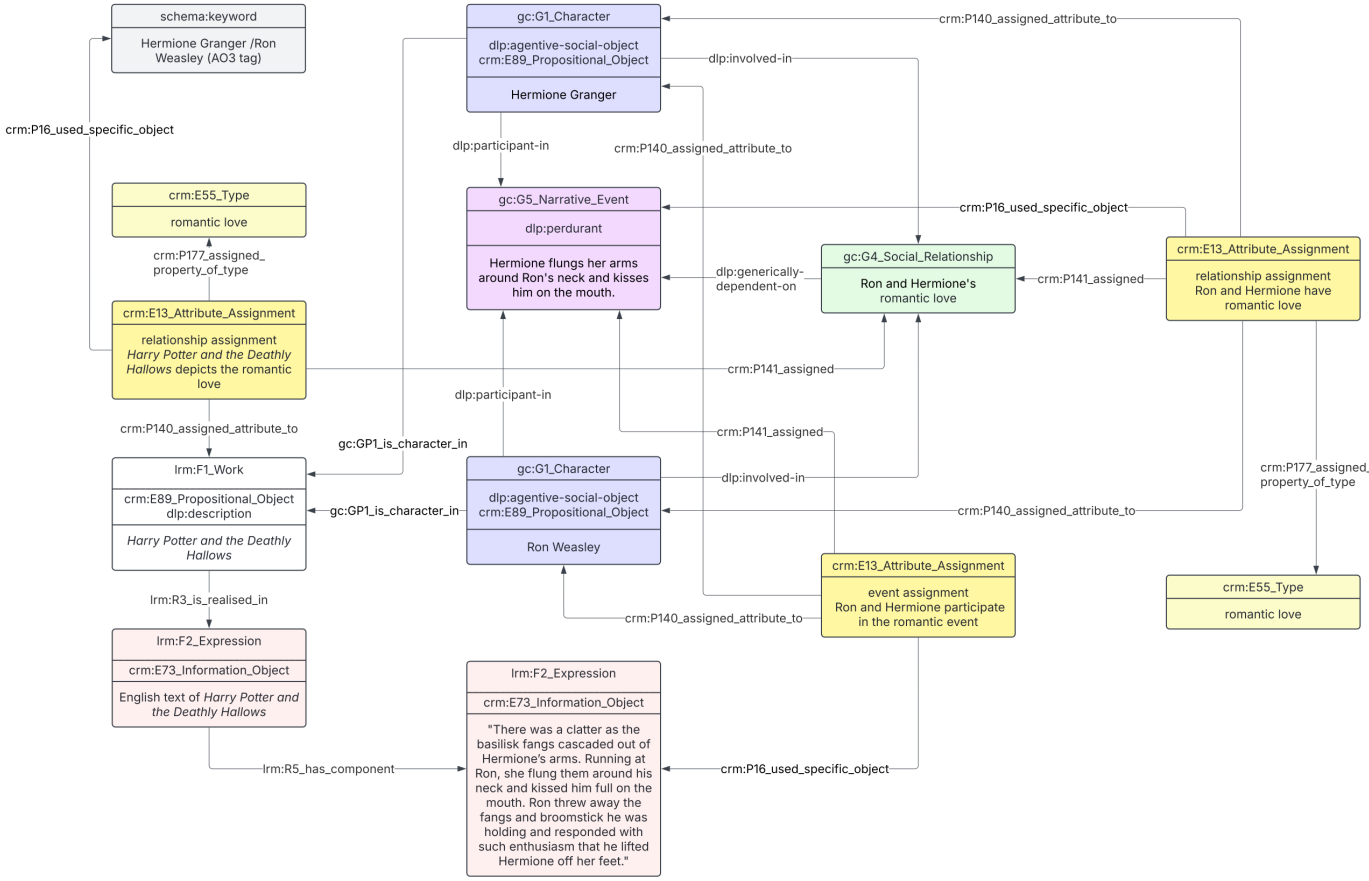

Figure 7. Inference module showing an example of inference of a social relationship from a narrative event.

The E13_Attribute_Assignment, as described in the CIDOC CRM, models the action of making attributions, offering a more flexible, neutral representation of interpretational claims across various scholarly frameworks.

4.7. Categorization

In addition to its modular structure, to enhance the interoperability, we utilize the CIDOC CRM class E55_Type to categorize instances into specific types. This approach allows for linking external resources, such as controlled vocabularies and thesauri, facilitating alignment with various literary and narrative theories. The E55_Type class provides a mechanism for organizing hierarchical classifications through the property P127_has_broader_term (has_narrower_term). This allows for a structured representation of narrative concepts at different levels of granularity. Below are some examples of how categorization is applied within our ontology:

- Character features (G17_Character_Feature): Instances in this class can be further specified into "personality traits" (e.g., bravery), "physical attributes" (e.g., height), etc.
- Social relationships (G6_Social_Relationship): Relationships between characters can be categorized into types such as "friendship", "romantic love", "rivalry", and so on.
- Roles (G6_Relationship_Role, G11_Narrative_Role): Relationship roles can be classified as "friend", "lover", "beloved", etc. Narrative roles could be categorized as "archetypes", including "Proppian dramatis personae" (e.g., hero, villain) or "commedia dell'arte characters" (Lea 1962).
- Narrative events (G5_Narrative_Event): Narrative events can be categorized into "change of state", "process", or "state".
- Narrative sequences (G7_Narrative_Sequences): Sequences may be classified into a "hyleme sequence", which can be further specified (has a narrower term) into "fabula", and "syuzhet".
- Narrative functions (G10_Narrative_Function): Types of narrative functions could be "Proppian functions", "motifs" (e.g., Thompson's *Motif-Index of Folk-Literature* (1955–1958), etc.

5. Conclusions and Future Work

In this work, we have presented a modular ontology designed to address critical gaps in the computational representation of narrative and fiction by bridging theoretical rigor from literary studies with the practical demands of semantic technologies. While existing ontologies have advanced narrative modeling, they often fall short in integrating fictional entities, accommodating diverse narrative theories, or enabling cross-media comparison. By extending CIDOC CRM and leveraging DOLCE's cognitive foundations, GOLEM provides a flexible, interoperable framework that captures the complexities of narrative structure, character dynamics, and fictional worlds. Its modular design allows for nuanced representation of entities, events, social relationships, and settings while supporting provenance tracking and pluralistic interpretations.

This ontology advances computational literary studies by reconciling humanistic values—such as perspectivism and interdisciplinary dialogue—with machine-actionable data structures. Future work will focus on expanding domain-specific extensions (e.g., genre-specific taxonomies) and validating the model through larger-scale case studies across multilingual and multimodal narratives. Additionally, we will develop a reader response module to systematically model the reception of narratives. Understanding the "communications circuit"—the dynamic interaction between authors, publishers, and readers—is crucial for analyzing how ideas are disseminated and received across different cultural contexts (Antonini et al. 2021). By incorporating reader response theory, we aim to capture audience engagement, emotional reactions, and interpretative variations, providing deeper insights into the perception and evolution of narratives.

By fostering interoperability between literary theory, fan cultures, and computational analysis, GOLEM lays a foundation for richer comparative research on narrative and fiction and for more flexible and inclusive Digital Humanities infrastructure.

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Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Ontometrics Evaluation

This appendix presents selected structural metrics of the GOLEM ontology, obtained using the OntoMetrics tool (https://ontometrics.informatik.uni-rostock.de/ontologymetrics/, accessed on 21 September 2025).

Appendix A.1. Base Metrics

Table A1. Summary of base-level ontology metrics.

Metric	Value
Total Axioms	974
Logical Axioms	452
Declared Classes	49
Total Classes	49
Declared Object Properties	69
Total Object Properties	69
Declared Data Properties	1
Total Data Properties	1
Total Properties (Object + Data)	70
Declared Individuals	0
Total Individuals	0
DL Expressivity	`SHIN(D)`

Appendix A.2. Schema Metrics

Table A2. Schema-level metrics indicating richness and complexity.

Metric	Value
Attribute Richness	0.020
Inheritance Richness	2.612
Relationship Richness	0.618
Attribute-to-Class Ratio	0.000
Equivalence Ratio	0.020
Axiom-to-Class Ratio	19.878
Inverse Relations Ratio	0.478
Class-to-Relation Ratio	0.146

Appendix A.3. Graph Metrics

Table A3. Graph-theoretic metrics derived from the class hierarchy.

Metric	Value
Absolute Root Cardinality	22
Absolute Leaf Cardinality	28
Absolute Sibling Cardinality	45
Absolute Depth	88
Average Depth	1.630
Maximum Depth	3
Absolute Breadth	54
Average Breadth	3.000
Maximum Breadth	22
Leaf Fan-Out Ratio	0.571
Sibling Fan-Out Ratio	0.918
Tangledness Ratio	0.388
Total Number of Paths	54
Average Number of Paths	18

Notes

1 See https://ontometrics.informatik.uni-rostock.de/ontologymetrics/ (accessed on 21 September 2025).
2 See https://github.com/oeg-upm/fair_ontologies (accessed on 21 September 2025).
3 See https://github.com/GOLEM-lab/golem-ontology/wiki (accessed on 21 September 2025).
4 See https://ontology.golemlab.eu/ (accessed on 21 September 2025).
5 GOLEM's classes and properties are prefixed by the letter G and a progressive number, following CIDOC CRM and its extensions.
6 See https://akswnc7.informatik.uni-leipzig.de/dstreitmatter/archivo/ontologydesignpatterns.org/ont--dul--DUL--owl/2021.04.08-030256/ont--dul--DUL--owl_type=generatedDocu.html#d4e4447 (accessed on 21 September 2025).
7 The types of relationships are reported following AO3's conventions: "&" is used for family and friends, while "/" is used for romantic and erotic relationships.

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