CybOXTM Version 2.1.1 Part 5: Vocabularies

Working Draft 01

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Additional artifacts:

This prose specification is one component of a Work Product, which consists of:

* *CybOX™ Version 2.1.1 Part 01: Overview*.
* *CybOX™ Version 2.1.1 Part 02: Common*. [URI]
* *CybOX™ Version 2.1.1 Part 03: Core*. [URI]
* *CybOX™ Version 2.1.1 Part 04: Default Extensions*. [URI]
* *CybOX™ Version 2.1.1 Part 05: Default Vocabularies*. (this document)
* *CybOX™ Version 2.1.1 Part 06: UML Model*. [URI]
* *CybOX™ Version 2.1.1 Part 07: API Object*. [URI]
* *CybOX™ Version 2.1.1 Part 08: ARP Cache Object*. [URI]
* *CybOX™ Version 2.1.1 Part 09: AS Object*. [URI]
* *CybOXTM Version 2.1.1 Part 10: Account Object*. [URI]
* *CybOXTM Version 2.1.1 Part 11: Address Object*. [URI]
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* *CybOXTM Version 2.1.1 Part 49: Semaphore Object*. [URI]
* *CybOXTM Version 2.1.1 Part 50: Socket Address Object*. [URI]
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* *CybOXTM Version 2.1.1 Part 93: Win Waitable Timer Object*. [URI]
* *CybOXTM Version 2.1.1 Part 94: X509 Certificate Object*. [URI]

Related work:

This specification is related to:

* *STIXTM Version 1.2.1 (placeholder)*

Abstract:

The Cyber Observable Expression (CybOX™) is a standardized language for encoding and communicating high-fidelity information about cyber observables, whether dynamic events or stateful measures that are observable in the operational cyber domain. By specifying a common structured schematic mechanism for these cyber observables, the intent is to enable the potential for detailed automatable sharing, mapping, detection, and analysis heuristics. This specification document defines the Vocabularies data model, which includes definitions for default constrained enumerations of values for specific properties in other CybOX data models.

Status:

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# Introduction

[All text is normative unless otherwise labeled.]

The Cyber Observable Expression (CybOXTM) provides a common structure for representing cyber observables across and among the operational areas of enterprise cyber security. CybOX improves the consistency, efficiency, and interoperability of deployed tools and processes, and it increases overall situational awareness by enabling the potential for detailed automatable sharing, mapping, detection, and analysis heuristics.

This document serves as the specification for the CybOX Vocabularies Version 2.1.1 data model, which is one of ninety-three data models for CybOX content.

In Section **1.1,** we discuss additional specification documents, in Section **1.2,** we provide document conventions, and in Section **1.3,** we provide terminology. References are given in Section **1.4**. In Section **2**, we give background information necessary to fully understand the Vocabularies data model. We present the Vocabularies data model specification details in Section **3**, and conformance information in Section **4**.

## CybOXTM Specification Documents

The CybOX specification consists of a formal UML model and a set of textual specification documents that explain the UML model. Specification documents have been written for each of the individual data models that compose the full CybOX UML model.

CybOX has a modular design comprising two fundamental data models and a collection of Object data models. The fundamental data models – CybOX Core and CybOX Common – provide essential CybOX structure and functionality. The CybOX Objects, defined in individual data models, are precise characterizations of particular types of observable cyber entities (e.g., HTTP session, Windows registry key, DNS query).

Use of the CybOX Core and Common data models is required; however, use of the CybOX Object data models is purely optional: users select and use only those Objects and corresponding data models that are needed. Importing the entire CybOX suite of data models is not necessary.

The [*CybOX™ Version 2.1.1 Part 1: Overview*](#AdditionalArtifacts) document provides a comprehensive overview of the full set of CybOX data models, which in addition to the Core, Common, and numerous Object data models, includes various extension data models and a vocabularies data model, which contains a set of default controlled vocabularies. [*CybOX™ Version 2.1.1 Part 1: Overview*](#AdditionalArtifacts) also summarizes the relationship of CybOX to other languages, and outlines general CybOX data model conventions.

## Document Conventions

The following conventions are used in this document.

### Fonts

The following font and font style conventions are used in the document:

* Capitalization is used for CybOX high-level concepts, which are defined in [*CybOX™ Version 2.1.1 Part 1: Overview*](#AdditionalArtifacts).

Examples: Action, Object, Event, Property

* The Courier New font is used for writing UML objects.

Examples: ActionType, cyboxCommon:BaseObjectPropertyType

Note that all high-level concepts have a corresponding UML object. For example, the Action high-level concept is associated with a UML class named, ActionType.

* The ‘*italic’* font (withsingle quotes) is used for noting actual, explicit values for CybOX Language properties. The *italic* font (without quotes) is used for noting example values.

Example:  *‘HashNameVocab-1.0,’ high, medium, low*

### UML Package References

Each CybOX data model is captured in a different UML package (e.g., Core package) where the packages together compose the full CybOX UML model. To refer to a particular class of a specific package, we use the format package\_prefix:class, where package\_prefix corresponds to the appropriate UML package.

Note that in this specification document, we do not explicitly specify the package prefix for any classes that originate from the Vocabularies data model.

### UML Diagrams

This specification makes use of UML diagrams to visually depict relationships between CybOX Language constructs. Note that the diagrams have been extracted directly from the full UML model for CybOX; they have not been constructed purely for inclusion in the specification documents. Typically, diagrams are included for the primary class of a data model, and for any other class where the visualization of its relationships between other classes would be useful. This implies that there will be very few diagrams for classes whose only properties are either a data type or a class from the CybOX Common data model. Other diagrams that are included correspond to classes that specialize a superclass and abstract or generalized classes that are extended by one or more subclasses.

In UML diagrams, classes are often presented with their attributes elided, to avoid clutter. The fully described class can usually be found in a related diagram. A class presented with an empty section at the bottom of the icon indicates that there are no attributes other than those that are visualized using associations.

#### Diagram Icons and Arrow Types

Diagram icons are used in a UML diagram to indicate whether a shape is a class, enumeration, or a data type, and decorative icons are used to indicate whether an element is an attribute of a class or an enumeration literal. In addition, two different arrow styles indicate either a directed association relationship (regular arrowhead) or a generalization relationship (triangle-shaped arrowhead). The icons and arrow styles we use are shown and described in **Table 1‑1**.

Table ‑. UML diagram icons

|  |  |
| --- | --- |
| **Icon** | **Description** |
|  | This diagram icon indicates a class. If the name is in italics, it is an abstract class. |
|  | This diagram icon indicates an enumeration. |
|  | This diagram icon indicates a data type. |
|  | This decorator icon indicates an attribute of a class. The green circle means its visibility is public. If the circle is red or yellow, it means its visibility is private or protected. |
|  | This decorator icon indicates an enumeration literal. |
|  | This arrow type indicates a directed association relationship. |
|  | This arrow type indicates a generalization relationship. |

### Enumeration Table Notation

Throughout Section **3**, tables are used to describe the list of defined values for each default vocabulary. Each property table consists of a column of literal names, and a description column that describes the literal name, if needed.

## Terminology

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [**[RFC2119]**](#rfc2119).

## Normative References

[RFC2119] Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. <http://www.ietf.org/rfc/rfc2119.txt>.

# Background Information

In this section, we provide high-level information about the Vocabularies data model that is necessary to fully understand the specification details given in Section **3**.

There are three vocabulary-related UML data types defined in the Common data model, and together they provide a content creator with four choices for defining content, listed below in order of formality:

* Leverage a default vocabulary using the ControlledVocabularyStringType data type. CybOX v1.2.1 defines a collection of default vocabularies and associated enumerations that are based on input from the CybOX; however, not all vocabulary properties have an assigned default vocabulary.
* Formally define a custom vocabulary using the ControlledVocabularyStringType data type. To achieve value enforcement, a custom vocabulary MUST be formally added to the CybOX Vocabulary data model. Because this is an extension of the CybOX Vocabulary data model, producers and consumers MUST be aware of the addition to the data model for successful sharing of CybOX documents.
* Reference an externally-defined, custom vocabulary using the UnenforcedVocabularyStringType data type to constrain the set of values. Externally-defined vocabularies are publically defined, but have not been included as formally specified vocabularies within the CybOX Vocabulary data model using the ControlledVocabularyStringType data type. In this case, it is sufficient to specify the name of the vocabulary and a URL that defines that vocabulary.
* Choose an arbitrary and unconstrained value using the VocabularyStringType data type.

While not required by the general CybOX language, default vocabularies should be used whenever possible to ensure the greatest level of compatibility between CybOX users. If an appropriate default vocabulary is not available, a formally defined custom vocabulary can be specified and leveraged. In addition to compatibility advantages, using formally defined vocabularies (whether default vocabularies or otherwise defined) enables enforced use of valid enumeration values.

If a formally defined vocabulary is not sufficient for a content producer’s purposes, the CybOX Vocabulary data model allows the two alternatives listed above: externally defined custom vocabularies and arbitrary string values, which dispense with enumerated vocabularies altogether. If a custom vocabulary is not formally added to the Vocabulary data model, then no enforcement policy of appropriate values is specified.

The base data type of the VocabularyStringType data type is a BasicString from the BasicTypes package. Additionally, VocabularyStringType is also a sub data type of cyboxCommon:PatternFieldGroup, in order to permit complex (i.e. regular-expression based) specifications.

The UML diagram shown in **Figure 2‑1** illustrates the relationships between the three vocabulary data types defined in the CybOX Common data model. As illustrated, all controlled vocabularies formally defined within the CybOX Vocabulary data model are defined using an enumeration derived from the ControlledVocabularyStringType data type.

As shown, the HashNameVocab-1.0 enumeration (used as a defined controlled vocabulary exemplar) is defined as a specialization of the ControlledVocabularyStringType data type, and therefore it is also a specialization of the VocabularyStringType data type.

Further details of each vocabulary class are provided in Subsections **2.1.1** through **2.1.3**.



Figure ‑. UML diagram of the CybOX Vocabulary data model

### VocabularyStringType Data Type

The VocabularyStringType data type is the basic data type of all vocabularies. Therefore, all properties in the collection of CybOX data models that makes use of the Vocabulary data model must be defined to use the VocabularyStringType data type. Because this data type is a specialization of the basicDataTypes:BasicString data type, it can be used to support the arbitrary string option for vocabularies.

### UnenforcedVocabularyStringType Data Type

The UnenforcedVocabularyStringType data type specifies custom vocabulary values via an enumeration defined outside of the CybOX Vocabulary data model. It extends the VocabularyStringType data type. Note that the CybOX vocabulary data model does not define any enforcement policy for this data type.

The property table of the UnenforcedVocabularyStringType data type is given in **Table 2‑1**.

Table ‑. Properties of the UnenforcedVocabularyStringType data type

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Type** | **Multiplicity** | **Description** |
| **vocab\_name** | basicDataTypes:  NoEmbeddedQuoteString | 0..1 | The vocab\_name property specifies the name of the externally defined vocabulary. |
| **vocab\_reference** | basicDataTypes:URI | 0..1 | The vocab\_reference property specifies the location of the externally defined vocabulary using a Uniform Resource Identifier (URI). |

### ControlledVocabularyStringType Data Type

The ControlledVocabularyStringType data type specifies a formally defined vocabulary. It is an abstract data type so it MUST be extended via an enumeration from the CybOX Vocabulary data model. Any custom vocabulary must be defined via an enumeration added to the CybOX Vocabulary data model, if appropriate enumeration values are to be enforced.

The ControlledVocabularyStringType class has no properties of its own, so there is no associated property table.

# CybOX Default Vocabularies Data Models

The CybOX Vocabularies data model is defined as one UML package, but can be thought of as a collection of separate data models, each containing one UML enumeration. Each vocabulary will be specified using a separate version number, which is appended to the enumeration name. This facilitates adding literals to the enumeration without the need to update the version number of any of the other CybOX data models or the version number of the full CybOX specification.

## ActionTypeVocab-1.0 Enumeration

The ActionTypeVocab enumeration is the default CybOX vocabulary for Action classes, captured via the ActionType class (Type property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Accept** | Specifies the atomic action of accepting an object or value. |
| **Access** | Specifies the atomic action of accessing an object. |
| **Add** | Specifies the atomic action of adding an object. |
| **Alert** | Specifies the atomic action of issuing an alert. |
| **Allocate** | Specifies the atomic action of allocating an object. |
| **Archive** | Specifies the atomic action of archiving an object or data. |
| **Assign** | Specifies the atomic action of assigning a value to an object. |
| **Audit** | Specifies the atomic action of auditing an object or data. |
| **Backup** | Specifies the atomic action of backing up an object or data. |
| **Bind** | Specifies the atomic action of binding two objects. |
| **Block** | Specifies the atomic action of blocking access to an object or resource. |
| **Call** | Specifies the atomic action of calling an object or resource. |
| **Change** | Specifies the atomic action of changing an object. |
| **Check** | Specifies the atomic action of checking an object. |
| **Clean** | Specifies the atomic action of cleaning an object, such as a file system. |
| **Click** | Specifies the atomic action of clicking an object, as with a mouse. |
| **Close** | Specifies the atomic action of closing an object, such as a window handle. |
| **Compare** | Specifies the atomic action of comparing two objects. |
| **Compress** | Specifies the atomic action of compressing an object. |
| **Configure** | Specifies the atomic action of configuring a resource. |
| **Connect** | Specifies the atomic action of connecting to an object, such as a service or resource. |
| **Control** | Specifies the atomic action of controlling an object or data. |
| **Copy/Duplicate** | Specifies the atomic action of copying or duplicating an object or data EXCEPT in cases where the object is considered a thread or process as a whole. |
| **Create** | Specifies the atomic action of creating an object or data. |
| **Decode** | Specifies the atomic action of decoding an object or data. |
| **Decompress** | Specifies the atomic action of decompressing an object, such as an archive. |
| **Decrypt** | Specifies the atomic action of decrypting an object. |
| **Deny** | Specifies the atomic action of denying access to an object or resource. |
| **Depress** | Specifies the atomic action of depressing an object that has been pressed, such a button. |
| **Detect** | Specifies the atomic action of detecting an object. |
| **Disconnect** | Specifies the atomic action of disconnecting from a service or resource. |
| **Download** | Specifies the atomic action of downloading an object or data. |
| **Draw** | Specifies the atomic action of drawing an object. |
| **Drop** | Specifies the atomic action of dropping an object, such as a connection. |
| **Encode** | Specifies the atomic action of encoding an object or data. |
| **Encrypt** | Specifies the atomic action of encrypting an object or data. |
| **Enumerate** | Specifies the atomic action of enumerating a list of objects. |
| **Execute** | Specifies the atomic action of executing an object, such as an executable file. |
| **Extract** | Specifies the atomic action of extracting an object. |
| **Filter** | Specifies the atomic action of filtering an object or data. |
| **Find** | Specifies the atomic action of finding an object or data. |
| **Flush** | Specifies the atomic action of flushing an object or data, such as a cache. |
| **Fork** | Specifies the atomic action of forking, as with a process. Because this is usually associated with processes and threads and does not generalize to objects, it is DIFFERENT from Copy/Duplicate. |
| **Free** | Specifies the atomic action of freeing an object. |
| **Get** | Specifies the atomic action of getting a value from an object. |
| **Hook** | Specifies the atomic action of hooking an object to another object. |
| **Hide** | Specifies the atomic action of hiding an object. |
| **Impersonate** | Specifies the atomic action of impersonation, in which an object performs actions that assume the character or appearance of another object. |
| **Initialize** | Specifies the atomic action of initializing an object. |
| **Inject** | Specifies the atomic action of injecting an object. |
| **Install** | Specifies the atomic action of installing an object, such as an application, program, patch, or other resource. |
| **Interleave** | Specifies the atomic action of interleaving an object, that is, the action of arranging data in a non-contiguous way to increase performance. |
| **Join** | Specifies the atomic action of joining one object to another object. |
| **Kill** | Specifies the atomic action of killing an object, as with a thread or program. |
| **Listen** | Specifies the atomic action of listening to an object, such as to a port on a network connection. |
| **Load** | Specifies the atomic action of loading an object. |
| **Lock** | Specifies the atomic action of locking an object. |
| **Login/Logon** | Specifies the atomic action of logging into an object, such as into a system or application. |
| **Logout/Logoff** | Specifies the atomic action of logging out of an object, such as a system or application. |
| **Map** | Specifies the atomic action of mapping an object to another object or data. |
| **Merge** | Specifies the atomic action of merging one object to another object. |
| **Modify** | Specifies the atomic action of modifying an object. |
| **Monitor** | Specifies the atomic action of monitoring the state of an object. |
| **Move** | Specifies the atomic action of moving an object. |
| **Open** | Specifies the atomic action of opening an object. |
| **Pack** | Specifies the atomic action of packing an object. |
| **Pause** | Specifies the atomic action of pausing an object, such as a thread or process. |
| **Press** | Specifies the atomic action of pressing an object, such as a button. |
| **Protect** | Specifies the atomic action of protecting an object. |
| **Quarantine** | Specifies the atomic action of placing an object in quarantine, that is, to store the object in an isolated area away from other objects so it can be safely operated on. |
| **Query** | Specifies the atomic action of querying an object. |
| **Queue** | Specifies the atomic action of queueing an object. |
| **Raise** | Specifies the atomic action of raising an object. |
| **Read** | Specifies the atomic action of reading an object. |
| **Receive** | Specifies the atomic action of receiving an object. |
| **Release** | Specifies the atomic action of releasing an object. |
| **Rename** | Specifies the atomic action of renaming an object. |
| **Remove/Delete** | Specifies the atomic action of removing or deleting an object. |
| **Replicate** | Specifies the atomic action of replicating an object. |
| **Restore** | Specifies the atomic action of restoring an object. |
| **Resume** | Specifies the atomic action of resuming an object, as with a process or thread. |
| **Revert** | Specifies the atomic action of reverting an object. |
| **Run** | Specifies the atomic action of running an object, such as an application. |
| **Save** | Specifies the atomic action of saving an object. |
| **Scan** | Specifies the atomic action of scanning for an object or data. |
| **Schedule** | Specifies the atomic action of scheduling an object, such as an event. |
| **Search** | Specifies the atomic action of searching for an object. |
| **Send** | Specifies the atomic action of sending an object. |
| **Set** | Specifies the atomic action of setting an object to a value. |
| **Shutdown** | Specifies the atomic action of shutting down an object. |
| **Sleep** | Specifies the atomic action of putting to sleep an object. |
| **Snapshot** | Specifies the atomic action taking a snapshot of an object. |
| **Start** | Specifies the atomic action of starting an object, such as a thread or process. |
| **Stop** | Specifies the atomic action of stopping an object, such as a thread or process. |
| **Suspend** | Specifies the atomic action of suspending an object, such an account or privileges for an account. |
| **Synchronize** | Specifies the atomic action of synchronizing an object. |
| **Throw** | Specifies the atomic action of throwing an object, such as an exception in a programming language. |
| **Transmit** | Specifies the atomic action of transmitting an object. |
| **Unblock** | Specifies the atomic action of unblocking an object. |
| **Unhide** | Specifies the atomic action of unhiding an object. |
| **Unhook** | Specifies the atomic action of unhooking an object from another object, that is, to detach. |
| **Uninstall** | Specifies the atomic action of uninstalling an object. |
| **Unload** | Specifies the atomic action of unloading an object. |
| **Unlock** | Specifies the atomic action of unlocking an object. |
| **Unmap** | Specifies the atomic action of unmapping an object from another object or data. |
| **Unpack** | Specifies the atomic action of unpacking an object, such as an archive. |
| **Update** | Specifies the atomic action of updating an object. |
| **Upgrade** | Specifies the atomic action of upgrading an object. |
| **Upload** | Specifies the atomic action of uploading an object. |
| **Wipe/Destroy/Purge** | Specifies the atomic action of wiping, destroying, or purging an object. |
| **Write** | Specifies the atomic action of writing an object. |

## ActionNameVocab-1.1 Enumeration

The ActionNameVocab enumeration is the default CybOX vocabulary for Action names, captured via the ActionType class (Name property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Accept Socket Connection** | Specifies the defined action of accepting a socket connection. |
| **Add Connection to Network Share** | Specifies the defined action of adding a connection to an existing network share. |
| **Add Network Share** | Specifies the defined action of adding a new network share. |
| **Add System Call Hook** | Specifies the defined action of adding a new system call hook. |
| **Add User** | Specifies the defined action of adding a new user. |
| **Add Windows Hook** | Specifies the defined action of adding a new Windows hook. |
| **Add Scheduled Task** | Specifies the defined action of adding a scheduled task. |
| **Allocate Virtual Memory in Process** | Specifies the defined action of allocating virtual memory in a process. |
| **Bind Address to Socket** | Specifies the defined action of binding an address to a socket. |
| **Change Service Configuration** | Specifies the defined action of changing the service configuration. |
| **Check for Remote Debugger** | Specifies the defined action of checking for a remote debugger. |
| **Close Port** | Specifies the defined action of closing a port. |
| **Close Registry Key** | Specifies the defined action of closing a registry key. |
| **Close Socket** | Specifies the defined action of closing a socket. |
| **Configure Service** | Specifies the defined action of configuring a service. |
| **Connect to IP** | Specifies the defined action of connecting to an IP address. |
| **Connect to Named Pipe** | Specifies the defined action of connecting to a named pipe. |
| **Connect to Network Share** | Specifies the defined action of connecting to a network share. |
| **Connect to Socket** | Specifies the defined action of connecting to a socket. |
| **Connect to URL** | Specifies the defined action of connecting to a URL. |
| **Control Driver** | Specifies the defined action of controlling a driver. |
| **Control Service** | Specifies the defined action of controlling a service. |
| **Copy File** | Specifies the defined action of copying a file. |
| **Create Dialog Box** | Specifies the defined action of creating a dialog box. |
| **Create Directory** | Specifies the defined action of creating a new directory. |
| **Create Event** | Specifies the defined action of creating an event. |
| **Create File** | Specifies the defined action of creating a file. |
| **Create File Alternate Data Stream** | Specifies the defined action of creating an alternate data stream in a file. |
| **Create File Mapping** | Specifies the defined action of creating a new file mapping. |
| **Create File Symbolic Link** | Specifies the defined action of creating a file symbolic link. |
| **Create Hidden File** | Specifies the defined action of creating a hidden file. |
| **Create Mailslot** | Specifies the defined action of creating a mailslot. |
| **Create Module** | Specifies the defined action of creating a module. |
| **Create Mutex** | Specifies the defined action of creating a mutex. |
| **Create Named Pipe** | Specifies the defined action of creating a named pipe. |
| **Create Process** | Specifies the defined action of creating a process. |
| **Create Process as User** | Specifies the defined action of creating a process as user. |
| **Create Registry Key** | Specifies the defined action of creating a registry key. |
| **Create Registry Key Value** | Specifies the defined action of creating a registry key value. |
| **Create Remote Thread in Process** | Specifies the defined action of creating a remote thread in a process. |
| **Create Service** | Specifies the defined action of creating a service. |
| **Create Socket** | Specifies the defined action of creating a socket. |
| **Create Symbolic Link** | Specifies the defined action of creating a symbolic link. |
| **Create Thread** | Specifies the defined action of creating a thread. |
| **Create Window** | Specifies the defined action of creating a window. |
| **Delete Directory** | Specifies the defined action of deleting a directory. |
| **Delete File** | Specifies the defined action of deleting a file. |
| **Delete Named Pipe** | Specifies the defined action of deleting a named pipe. |
| **Delete Network Share** | Specifies the defined action of deleting a network share. |
| **Delete Registry Key** | Specifies the defined action of deleting a registry key. |
| **Delete Registry Key Value** | Specifies the defined action of deleting a registry key value. |
| **Delete Service** | Specifies the defined action of deleting a service. |
| **Delete User** | Specifies the defined action of deleting a user. |
| **Disconnect from Named Pipe** | Specifies the defined action of disconnecting from a named pipe. |
| **Disconnect from Network Share** | Specifies the defined action of disconnecting from a network share. |
| **Disconnect from Socket** | Specifies the defined action of disconnecting from a socket. |
| **Download File** | Specifies the defined action of downloading a file. |
| **Enumerate DLLs** | Specifies the defined action of enumerating DLLs. |
| **Enumerate Network Shares** | Specifies the defined action of enumerating network shares. |
| **Enumerate Protocols** | Specifies the defined action of enumerating protocols. |
| **Enumerate Registry Key Subkeys** | Specifies the defined action of enumerating registry key subkeys. |
| **Enumerate Registry Key Values** | Specifies the defined action of enumerating registry key values. |
| **Enumerate Threads in Process** | Specifies the defined action of enumerating threads in a process. |
| **Enumerate Processes** | Specifies the defined action of enumerating processes. |
| **Enumerate Services** | Specifies the defined action of enumerating services. |
| **Enumerate System Handles** | Specifies the defined action of enumerating system handles. |
| **Enumerate Threads** | Specifies the defined action of enumerating threads. |
| **Enumerate Users** | Specifies the defined action of enumerating users. |
| **Enumerate Windows** | Specifies the defined action of enumerating windows. |
| **Find File** | Specifies the defined action of finding a file. |
| **Find Window** | Specifies the defined action of finding a window. |
| **Flush Process Instruction Cache** | Specifies the defined action of flushing the process instruction cache. |
| **Free Library** | Specifies the defined action of freeing a library. |
| **Free Process Virtual Memory** | Specifies the defined action of freeing virtual memory from a process. |
| **Get Disk Free Space** | Specifies the defined action of getting the amount of free space available on a disk. |
| **Get Disk Type** | Specifies the defined action of getting the disk type. |
| **Get Elapsed System Up Time** | Specifies the defined action of getting the elapsed system up-time. |
| **Get File Attributes** | Specifies the defined action of getting file attributes. |
| **Get Function Address** | Specifies the defined action of getting the function address. |
| **Get System Global Flags** | Specifies the defined action of getting system global flags. |
| **Get Host By Address** | Specifies the defined action of getting host by address. |
| **Get Host By Name** | Specifies the defined action of getting host by name. |
| **Get Host Name** | Specifies the defined action of getting the host name. |
| **Get Library File Name** | Specifies the defined action of getting the library file name. |
| **Get Library Handle** | Specifies the defined action of getting the library handle. |
| **Get NetBIOS Name** | Specifies the defined action of getting the NetBIOS name. |
| **Get Process Current Directory** | Specifies the defined action of getting the process's current directory. |
| **Get Process Environment Variable** | Specifies the defined action of getting the process environment variable. |
| **Get Process Startup Information** | Specifies the defined action of getting the process startup information. |
| **Get Processes Snapshot** | Specifies the defined action of getting the processes snapshot. |
| **Get Registry Key Attributes** | Specifies the defined action of getting the attributes of a registry key. |
| **Get Service Status** | Specifies the defined action of getting the service status. |
| **Get System Global Flags** | Specifies the defined action of getting the system global flags. |
| **Get System Local Time** | Specifies the defined action of getting the local time on a system. |
| **Get System Host Name** | Specifies the defined action of getting the system host name. |
| **Get System NetBIOS Name** | Specifies the defined action of getting the NetBIOS name of a system. |
| **Get System Network Parameters** | Specifies the defined action of getting the system network parameters. |
| **Get System Time** | Specifies the defined action of getting the system time. |
| **Get Thread Context** | Specifies the defined action of getting the thread context. |
| **Get Thread Username** | Specifies the defined action of getting the thread username. |
| **Get User Attributes** | Specifies the defined action of getting the attributes of a user. |
| **Get Username** | Specifies the defined action of getting a username. |
| **Get Windows Directory** | Specifies the defined action of getting a Windows directory. |
| **Get Windows System Directory** | Specifies the defined action of getting a Windows directory. |
| **Get Windows Temporary Files Directory** | Specifies the defined action of getting the Windows temporary files directory. |
| **Hide Window** | Specifies the defined action of hiding a window. |
| **Impersonate Process** | Specifies the defined action of impersonating a process. |
| **Impersonate Thread** | Specifies the defined action of impersonating a thread. |
| **Inject Memory Page** | Specifies the defined action of injecting a memory page into a process. |
| **Kill Process** | Specifies the defined action of killing a process. |
| **Kill Thread** | Specifies the defined action of killing a thread. |
| **Kill Window** | Specifies the defined action of killing a window. |
| **Listen on Port** | Specifies the defined action of listening on a specific port. |
| **Listen on Socket** | Specifies the defined action of listening on a socket. |
| **Load and Call Driver** | Specifies the defined action of loading and calling a driver. |
| **Load Driver** | Specifies the defined action of loading a driver. |
| **Load Library** | Specifies the defined action of loading a library. |
| **Load Module** | Specifies the defined action of loading a module. |
| **Lock File** | Specifies the defined action of locking a file. |
| **Logon as User** | Specifies the defined action of logging on as a user. |
| **Map File** | Specifies the defined action of mapping a file. |
| **Map Library** | Specifies the defined action of mapping a library. |
| **Map View of File** | Specifies the defined action of mapping a view of a file. |
| **Modify File** | Specifies the defined action of modifying a file. |
| **Modify Named Pipe** | Specifies the defined action of modifying a named pipe. |
| **Modify Process** | Specifies the defined action of modifying a process. |
| **Modify Service** | Specifies the defined action of modifying a service. |
| **Modify Registry Key** | Specifies the defined action of modifying a registry key. |
| **Modify Registry Key Value** | Specifies the defined action of modifying a registry key value. |
| **Monitor Registry Key** | Specifies the defined action of monitoring a registry key. |
| **Move File** | Specifies the defined action of moving a file. |
| **Open File** | Specifies the defined action of opening a file. |
| **Open File Mapping** | Specifies the defined action of opening a file mapping. |
| **Open Mutex** | Specifies the defined action of opening a mutex. |
| **Open Port** | Specifies the defined action of opening a port. |
| **Open Process** | Specifies the defined action of opening a process. |
| **Open Registry Key** | Specifies the defined action of opening a registry key. |
| **Open Service** | Specifies the defined action of opening a service. |
| **Open Service Control Manager** | Specifies the defined action of opening a service control manager. |
| **Protect Virtual Memory** | Specifies the defined action of protecting virtual memory. |
| **Query Disk Attributes** | Specifies the defined action of querying disk attributes. |
| **Query DNS** | Specifies the defined action of querying DNS. |
| **Query Process Virtual Memory** | Specifies the defined action of querying process virtual memory. |
| **Queue APC in Thread** | Specifies the defined action of querying the Asynchronous Procedure Call (APC) in the context of a thread. |
| **Read File** | Specifies the defined action of reading a file. |
| **Read From Named Pipe** | Specifies the defined action of reading from a named pipe. |
| **Read From Process Memory** | Specifies the defined action of reading from process memory. |
| **Read Registry Key Value** | Specifies the defined action of reading a registry key value. |
| **Receive Data on Socket** | Specifies the defined action of receiving data on a socket. |
| **Receive Email Message** | Specifies the defined action of receiving an email message. |
| **Release Mutex** | Specifies the defined action of releasing a mutex. |
| **Rename File** | Specifies the defined action of renaming a file. |
| **Revert Thread to Self** | Specifies the defined action of reverting a thread to its self. |
| **Send Control Code to File** | Specifies the defined action of sending a control code to a file. |
| **Send Control Code to Pipe** | Specifies the defined action of sending a control code to a pipe. |
| **Send Control Code to Service** | Specifies the defined action of sending control code to a service. |
| **Send Data on Socket** | Specifies the defined action of sending data on a socket. |
| **Send Data to Address on Socket** | Specifies the defined action of sending data to the address on a socket. |
| **Send DNS Query** | Specifies the defined action of sending a DNS query. |
| **Send Email Message** | Specifies the defined action of sending an email message. |
| **Send ICMP Request** | Specifies the defined action of sending an ICMP request. |
| **Send Reverse DNS Query** | Specifies the defined action of sending a reverse DNS query. |
| **Set File Attributes** | Specifies the defined action of setting file attributes. |
| **Set NetBIOS Name** | Specifies the defined action of setting the NetBIOS name. |
| **Set Process Current Directory** | Specifies the defined action of setting the process current directory. |
| **Set Process Environment Variable** | Specifies the defined action of setting the process environment variable. |
| **Set System Global Flags** | Specifies the defined action of setting system global flags. |
| **Set System Host Name** | Specifies the defined action of setting the system host name. |
| **Set System Time** | Specifies the defined action of setting the system time. |
| **Set Thread Context** | Specifies the defined action of setting the thread context. |
| **Show Window** | Specifies the defined action of showing a window. |
| **Shutdown System** | Specifies the defined action of shutting down a system. |
| **Sleep Process** | Specifies the defined action of sleeping a process. |
| **Sleep System** | Specifies the defined action of sleeping a system. |
| **Start Service** | Specifies the defined action of starting a service. |
| **Unload Driver** | Specifies the defined action of unloading a driver. |
| **Unlock File** | Specifies the defined action of unlocking a file. |
| **Unmap File** | Specifies the defined action of unmapping a file. |
| **Unload Module** | Specifies the defined action of unloading a module. |
| **Upload File** | Specifies the defined action of uploading a file. |
| **Write to File** | Specifies the defined action of writing to a file. |
| **Write to Process Virtual Memory** | Specifies the defined action of writing to process virtual memory. |

## ActionNameVocab-1.0 Enumeration

The ActionNameVocab enumeration is the default CybOX vocabulary for Action names, captured via the ActionType class (Name property) in CybOX Core. The associated enumeration literals are provided in the table below. NOTE: As of CybOX Version 2.1, ActionNameVocab-1.0 is deprecated. Please use version 1.1 instead (see Section **3.2**).

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Accept Socket Connection** | Specifies the defined action of accepting a socket connection. |
| **Add Connection to Network Share** | Specifies the defined action of adding a connection to an existing network share. |
| **Add Network Share** | Specifies the defined action of adding a new network share. |
| **Add System Call Hook** | Specifies the defined action of adding a new system call hook. |
| **Add User** | Specifies the defined action of adding a new user. |
| **Add Windows Hook** | Specifies the defined action of adding a new Windows hook. |
| **Add Scheduled Task** | Specifies the defined action of adding a scheduled task. |
| **Allocate Virtual Memory in Process** | Specifies the defined action of allocating virtual memory in a process. |
| **Bind Address to Socket** | Specifies the defined action of binding an address to a socket. |
| **Change Service Configuration** | Specifies the defined action of changing the service configuration. |
| **Check for Remote Debugger** | Specifies the defined action of checking for a remote debugger. |
| **Close Port** | Specifies the defined action of closing a port. |
| **Close Registry Key** | Specifies the defined action of closing a registry key. |
| **Close Socket** | Specifies the defined action of closing a socket. |
| **Configure Service** | Specifies the defined action of configuring a service. |
| **Connect to IP** | Specifies the defined action of connecting to an IP address. |
| **Connect to Named Pipe** | Specifies the defined action of connecting to a named pipe. |
| **Connect to Network Share** | Specifies the defined action of connecting to a network share. |
| **Connect to Socket** | Specifies the defined action of connecting to a socket. |
| **Connect to URL** | Specifies the defined action of connecting to a URL. |
| **Control Driver** | Specifies the defined action of controlling a driver. |
| **Control Service** | Specifies the defined action of controlling a service. |
| **Copy File** | Specifies the defined action of copying a file. |
| **Create Dialog Box** | Specifies the defined action of creating a dialog box. |
| **Create Directory** | Specifies the defined action of creating a new directory. |
| **Create Event** | Specifies the defined action of creating an event. |
| **Create File** | Specifies the defined action of creating a file. |
| **Create File Alternate Data Stream** | Specifies the defined action of creating an alternate data stream in a file. |
| **Create File Mapping** | Specifies the defined action of creating a new file mapping. |
| **Create File Symbolic Link** | Specifies the defined action of creating a file symbolic link. |
| **Create Hidden File** | Specifies the defined action of creating a hidden file. |
| **Create Mailslot** | Specifies the defined action of creating a mailslot. |
| **Create Module** | Specifies the defined action of creating a module. |
| **Create Mutex** | Specifies the defined action of creating a mutex. |
| **Create Named Pipe** | Specifies the defined action of creating a named pipe. |
| **Create Process** | Specifies the defined action of creating a process. |
| **Create Process as User** | Specifies the defined action of creating a process as user. |
| **Create Registry Key** | Specifies the defined action of creating a registry key. |
| **Create Registry Key Value** | Specifies the defined action of creating a registry key value. |
| **Create Remote Thread in Process** | Specifies the defined action of creating a remote thread in a process. |
| **Create Service** | Specifies the defined action of creating a service. |
| **Create Socket** | Specifies the defined action of creating a socket. |
| **Create Symbolic Link** | Specifies the defined action of creating a symbolic link. |
| **Create Thread** | Specifies the defined action of creating a thread. |
| **Create Window** | Specifies the defined action of creating a window. |
| **Delete Directory** | Specifies the defined action of deleting a directory. |
| **Delete File** | Specifies the defined action of deleting a file. |
| **Delete Named Pipe** | Specifies the defined action of deleting a named pipe. |
| **Delete Network Share** | Specifies the defined action of deleting a network share. |
| **Delete Registry Key** | Specifies the defined action of deleting a registry key. |
| **Delete Registry Key Value** | Specifies the defined action of deleting a registry key value. |
| **Delete Service** | Specifies the defined action of deleting a service. |
| **Delete User** | Specifies the defined action of deleting a user. |
| **Disconnect from Named Pipe** | Specifies the defined action of disconnecting from a named pipe. |
| **Disconnect from Network Share** | Specifies the defined action of disconnecting from a network share. |
| **Disconnect from Socket** | Specifies the defined action of disconnecting from a socket. |
| **Download File** | Specifies the defined action of downloading a file. |
| **Enumerate DLLs** | Specifies the defined action of enumerating DLLs. |
| **Enumerate Network Shares** | Specifies the defined action of enumerating network shares. |
| **Enumerate Protocols** | Specifies the defined action of enumerating protocols. |
| **Enumerate Registry Key Subkeys** | Specifies the defined action of enumerating registry key subkeys. |
| **Enumerate Registry Key Values** | Specifies the defined action of enumerating registry key values. |
| **Enumerate Threads in Process** | Specifies the defined action of enumerating threads in a process. |
| **Enumerate Processes** | Specifies the defined action of enumerating processes. |
| **Enumerate Services** | Specifies the defined action of enumerating services. |
| **Enumerate System Handles** | Specifies the defined action of enumerating system handles. |
| **Enumerate Threads** | Specifies the defined action of enumerating threads. |
| **Enumerate Users** | Specifies the defined action of enumerating users. |
| **Enumerate Windows** | Specifies the defined action of enumerating windows. |
| **Find File** | Specifies the defined action of finding a file. |
| **Find Window** | Specifies the defined action of finding a window. |
| **Flush Process Instruction Cache** | Specifies the defined action of flushing the process instruction cache. |
| **Free Library** | Specifies the defined action of freeing a library. |
| **Free Process Virtual Memory** | Specifies the defined action of freeing virtual memory from a process. |
| **Get Disk Free Space** | Specifies the defined action of getting the amount of free space available on a disk. |
| **Get Disk Type** | Specifies the defined action of getting the disk type. |
| **Get Elapsed System Up Time** | Specifies the defined action of getting the elapsed system up-time. |
| **Get File Attributes** | Specifies the defined action of getting file attributes. |
| **Get Function Address** | Specifies the defined action of getting the function address. |
| **Get System Global Flags** | Specifies the defined action of getting system global flags. |
| **Get Host By Address** | Specifies the defined action of getting host by address. |
| **Get Host By Name** | Specifies the defined action of getting host by name. |
| **Get Host Name** | Specifies the defined action of getting the host name. |
| **Get Library File Name** | Specifies the defined action of getting the library file name. |
| **Get Library Handle** | Specifies the defined action of getting the library handle. |
| **Get NetBIOS Name** | Specifies the defined action of getting the NetBIOS name. |
| **Get Process Current Directory** | Specifies the defined action of getting the process's current directory. |
| **Get Process Environment Variable** | Specifies the defined action of getting the process environment variable. |
| **Get Process Startup Information** | Specifies the defined action of getting the process startup information. |
| **Get Processes Snapshot** | Specifies the defined action of getting the processes snapshot. |
| **Get Registry Key Attributes** | Specifies the defined action of getting the attributes of a registry key. |
| **Get Service Status** | Specifies the defined action of getting the service status. |
| **Get System Global Flags** | Specifies the defined action of getting the system global flags. |
| **Get System Local Time** | Specifies the defined action of getting the local time on a system. |
| **Get System Host Name** | Specifies the defined action of getting the system host name. |
| **Get System NetBIOS Name** | Specifies the defined action of getting the NetBIOS name of a system. |
| **Get System Network Parameters** | Specifies the defined action of getting the system network parameters. |
| **Get System Time** | Specifies the defined action of getting the system time. |
| **Get Thread Context** | Specifies the defined action of getting the thread context. |
| **Get Thread Username** | Specifies the defined action of getting the thread username. |
| **Get User Attributes** | Specifies the defined action of getting the attributes of a user. |
| **Get Username** | Specifies the defined action of getting a username. |
| **Get Windows Directory** | Specifies the defined action of getting a Windows directory. |
| **Get Windows System Directory** | Specifies the defined action of getting a directory. |
| **Get Windows Temporary Files Directory** | Specifies the defined action of getting the Windows temporary files directory. |
| **Hide Window** | Specifies the defined action of hiding a window. |
| **Impersonate Process** | Specifies the defined action of impersonating a process. |
| **Impersonate Thread** | Specifies the defined action of impersonating a thread. |
| **Inject Memory Page** | Specifies the defined action of injecting a memory page into a process. |
| **Kill Process** | Specifies the defined action of killing a process. |
| **Kill Thread** | Specifies the defined action of killing a thread. |
| **Kill Window** | Specifies the defined action of killing a window. |
| **Listen on Port** | Specifies the defined action of listening on a specific port. |
| **Listen on Socket** | Specifies the defined action of listening on a socket. |
| **Load and Call Driver** | Specifies the defined action of loading and calling a driver. |
| **Load Driver** | Specifies the defined action of loading a driver. |
| **Load Library** | Specifies the defined action of loading a library. |
| **Load Module** | Specifies the defined action of loading a module. |
| **Lock File** | Specifies the defined action of locking a file. |
| **Logon as User** | Specifies the defined action of logging on as a user. |
| **Map File** | Specifies the defined action of mapping a file. |
| **Map Library** | Specifies the defined action of mapping a library. |
| **Map View of File** | Specifies the defined action of mapping a view of a file. |
| **Modify File** | Specifies the defined action of modifying a file. |
| **Modify Named Pipe** | Specifies the defined action of modifying a named pipe. |
| **Modify Process** | Specifies the defined action of modifying a process. |
| **Modify Service** | Specifies the defined action of modifying a service. |
| **Modify Registry Key** | Specifies the defined action of modifying a registry key. |
| **Modify Registry Key Value** | Specifies the defined action of modifying a registry key value. |
| **Monitor Registry Key** | Specifies the defined action of monitoring a registry key. |
| **Move File** | Specifies the defined action of moving a file. |
| **Open File** | Specifies the defined action of opening a file. |
| **Open File Mapping** | Specifies the defined action of opening a file mapping. |
| **Open Mutex** | Specifies the defined action of opening a mutex. |
| **Open Port** | Specifies the defined action of opening a port. |
| **Open Process** | Specifies the defined action of opening a process. |
| **Open Registry Key** | Specifies the defined action of opening a registry key. |
| **Open Service** | Specifies the defined action of opening a service. |
| **Open Service Control Manager** | Specifies the defined action of opening a service control manager. |
| **Protect Virtual Memory** | Specifies the defined action of protecting virtual memory. |
| **Query Disk Attributes** | Specifies the defined action of querying disk attributes. |
| **Query DNS** | Specifies the defined action of querying DNS. |
| **Query Process Virtual Memory** | Specifies the defined action of querying process virtual memory. |
| **Queue APC in Thread** | Specifies the defined action of querying the asynchronous procedure call (APC) in the context of a thread. |
| **Read File** | Specifies the defined action of reading a file. |
| **Read From Named Pipe** | Specifies the defined action of reading from a named pipe. |
| **Read From Process Memory** | Specifies the defined action of reading from process memory. |
| **Read Registry Key Value** | Specifies the defined action of reading a registry key value. |
| **Receive Data on Socket** | Specifies the defined action of receiving data on a socket. |
| **Release Mutex** | Specifies the defined action of releasing a mutex. |
| **Rename File** | Specifies the defined action of renaming a file. |
| **Revert Thread to Self** | Specifies the defined action of reverting a thread to its self. |
| **Send Control Code to File** | Specifies the defined action of sending a control code to a file. |
| **Send Control Code to Pipe** | Specifies the defined action of sending a control code to a pipe. |
| **Send Control Code to Service** | Specifies the defined action of sending control code to a service. |
| **Send Data on Socket** | Specifies the defined action of sending data on a socket. |
| **Send Data to Address on Socket** | Specifies the defined action of sending data to the address on a socket. |
| **Send DNS Query** | Specifies the defined action of sending a DNS query. |
| **Send Email Message** | Specifies the defined action of sending an email message. |
| **Send ICMP Request** | Specifies the defined action of sending an ICMP request. |
| **Send Reverse DNS Query** | Specifies the defined action of sending a reverse DNS query. |
| **Set File Attributes** | Specifies the defined action of setting file attributes. |
| **Set NetBIOS Name** | Specifies the defined action of setting the NetBIOS name. |
| **Set Process Current Directory** | Specifies the defined action of setting the process current directory. |
| **Set Process Environment Variable** | Specifies the defined action of setting the process environment variable. |
| **Set System Global Flags** | Specifies the defined action of setting system global flags. |
| **Set System Host Name** | Specifies the defined action of setting the system host name. |
| **Set System Time** | Specifies the defined action of setting the system time. |
| **Set Thread Context** | Specifies the defined action of setting the thread context. |
| **Show Window** | Specifies the defined action of showing a window. |
| **Shutdown System** | Specifies the defined action of shutting down a system. |
| **Sleep Process** | Specifies the defined action of sleeping a process. |
| **Sleep System** | Specifies the defined action of sleeping a system. |
| **Start Service** | Specifies the defined action of starting a service. |
| **Unload Driver** | Specifies the defined action of unloading a driver. |
| **Unlock File** | Specifies the defined action of unlocking a file. |
| **Unmap File** | Specifies the defined action of unmapping a file. |
| **Unload Module** | Specifies the defined action of unloading a module. |
| **Upload File** | Specifies the defined action of uploading a file. |
| **Write to File** | Specifies the defined action of writing to a file. |
| **Write to Process Virtual Memory** | Specifies the defined action of writing to process virtual memory. |

## ActionArgumentNameVocab-1.0 Enumeration

The ActionArgumentNameVocab enumeration is the default CybOX vocabulary for Action argument names, captured via the ActionArgumentType class (Argument\_Name property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Access Mode** | Specifies an argument called access mode. |
| **APC Address** | Specifies an argument called APC address. |
| **APC Mode** | Specifies an argument called APC mode. |
| **API** | Specifies an argument called API. |
| **Application Name** | Specifies an argument called application name. |
| **Base Address** | Specifies an argument called base address. |
| **Base Address** | Specifies an argument called base address. |
| **Callback Address** | Specifies an argument called callback address. |
| **Code Address** | Specifies an argument called code address. |
| **Command** | Specifies an argument called command. |
| **Control Code** | Specifies an argument called control code. |
| **Control Parameter** | Specifies an argument called control parameter. |
| **Creation Flags** | Specifies an argument called creation flags. |
| **Database Name** | Specifies an argument called database name. |
| **Delay Time (ms)** | Specifies an argument called delay time (ms). |
| **Destination Address** | Specifies an argument called destination address. |
| **Error Control** | Specifies an argument called initial owner. |
| **File Information Class** | Specifies an argument called file information class. |
| **Flags** | Specifies an argument called flags. |
| **Function Address** | Specifies an argument called function address. |
| **Function Name** | Specifies an argument called function name. |
| **Function Name** | Specifies an argument called function name. |
| **Function Ordinal** | Specifies an argument called function ordinal. |
| **Hook Type** | Specifies an argument called hook type. |
| **Host Name** | Specifies an argument called host name. |
| **Hostname** | Specifies an argument called hostname. |
| **Initial Owner** | Specifies an argument called initial owner. |
| **Mapping Offset** | Specifies an argument called mapping offset. |
| **Number of Bytes Per Send** | Specifies an argument called number of bytes per send. |
| **Options** | Specifies an argument called options. |
| **Parameter Address** | Specifies an argument called parameter address. |
| **Password** | Specifies an argument called password. |
| **Privilege Name** | Specifies an argument called privilege name. |
| **Protection** | Specifies an argument called protection. |
| **Proxy Bypass** | Specifies an argument called proxy bypass. |
| **Proxy Name** | Specifies an argument called proxy name. |
| **Reason** | Specifies an argument called reason. |
| **Request Size** | Specifies an argument called request size. |
| **Requested Version** | Specifies an argument called requested version. |
| **Server** | Specifies an argument called server. |
| **Service Name** | Specifies an argument called service name. |
| **Service State** | Specifies an argument called service state. |
| **Service Type** | Specifies an argument called service type. |
| **Share Mode** | Specifies an argument called share mode. |
| **Shutdown Flag** | Specifies an argument called shutdown flag. |
| **Size (bytes)** | Specifies an argument called size (bytes). |
| **Sleep Time (ms)** | Specifies an argument called sleep time (ms). |
| **Source Address** | Specifies an argument called source address. |
| **Starting Address** | Specifies an argument called starting address. |
| **System Metric Index** | Specifies an argument called system metric index. |
| **Target PID** | Specifies an argument called target pid. |
| **Transfer Flags** | Specifies an argument called transfer flags. |
| **Username** | Specifies an argument called username. |

## ActionObjectAssociationTypeVocab-1.0 Enumeration

The ActionObjectAssocationVocab enumeration is the default CybOX vocabulary for Action-Object association classes, captured via the AssociatedObjectType class (Association\_Type property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Affected** | Specifies that the associated object was affected by the action. |
| **Initiating** | Specifies that the associated object initiated the action. |
| **Returned** | Specifies that the associated object was the result of the action. |
| **Utilized** | Specifies that the associated object was utilized by the action. |

## ActionRelationshipTypeVocab-1.0 Enumeration

The ActionObjectAssocationVocab enumeration is the default CybOX vocabulary for Action-Action relationships, captured via the ActionRelationshipType class (Type property) in the CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Dependent\_On** | Specifies that this action is dependent on the related action. |
| **Equivalent\_To** | Specifies that this entity (e.g., Action) is equivalent to the associated entity. |
| **Followed\_By** | Specifies that this action is followed by the related action. |
| **Initiated** | Specifies that this action initiated the related action. |
| **Initiated\_By** | Specifies that this action was initiated by the related action. |
| **Preceded\_By** | Specifies that this action is preceded by the related action. |
| **Related\_To** | Specifies that this action is simply related to the related action in some way. |

## EventTypeVocab-1.0.1 Enumeration

The EventTypeVocab enumeration is the default CybOX vocabulary for Event classes, captured via the EventType class (Type property) in the CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Account Ops (App Layer)** | Specifies the class of events dealing with account operations at the application layer. |
| **Anomaly Events** | Specifies the class of events dealing with anomaly events. |
| **API Calls** | Specifies the class of events dealing with API calls. |
| **App Layer Traffic** | Specifies the class of events dealing with application layer traffic. |
| **Application Logic** | Specifies the class of events dealing with application logic. |
| **Authentication Ops** | Specifies the class of events dealing with authentication operations. |
| **Authorization (ACL)** | Specifies the class of events dealing with authorization via Access Control Lists (ACL). |
| **Autorun** | Specifies the class of events dealing with autorun. |
| **Auto-update Ops** | Specifies the class of events dealing with auto-update operations. |
| **Basic System Ops** | Specifies the class of events dealing with basic system operations. |
| **Configuration Management** | Specifies the class of events dealing with configuration management. |
| **Data Flow** | Specifies the class of events dealing with data flow. |
| **DHCP** | Specifies the class of events dealing with the Dynamic Host Configuration Protocol (DHCP). |
| **DNS Lookup Ops** | Specifies the class of events dealing with DNS Lookup operations. |
| **Email Ops** | Specifies the class of events dealing with e-mail operations. |
| **File Ops (CRUD)** | Specifies the class of events dealing with file operations. |
| **GUI/KVM** | Specifies the class of events dealing with the GUI/Kernel-based Virtual Machine (KVM). |
| **HTTP Traffic** | Specifies the class of events dealing with HTTP traffic. |
| **IP Ops** | Specifies the class of events dealing with IP Operations. |
| **IPC** | Specifies the class of events dealing with thread management. |
| **Memory Ops** | Specifies the class of events dealing with memory operations. |
| **Packet Traffic** | Specifies the class of events dealing with packet traffic. |
| **Port Scan** | Specifies the class of events dealing with port scanning. |
| **Privilege Ops** | Specifies the class of events dealing with privilege operations. |
| **Procedural Compliance** | Specifies the class of events dealing with procedural compliance. |
| **Process Mgt** | Specifies the class of events dealing with process management. |
| **Redirection** | Specifies the class of events dealing with redirection. |
| **Registry Ops** | Specifies the class of events dealing with registry operations. |
| **Service Mgt** | Specifies the class of events dealing with service management. |
| **Session Mgt** | Specifies the class of events dealing with session management. |
| **Signature Detection** | Specifies the class of events dealing with signature detection. |
| **Socket Ops** | Specifies the class of events dealing with thread management. |
| **SQL** | Specifies the class of events dealing with the SQL language. |
| **Technical Compliance** | Specifies the class of events dealing with technical compliance. |
| **Thread Mgt** | Specifies the class of events dealing with thread management. |
| **USB/Media Detection** | Specifies the class of events dealing with USB and/or media detection. |
| **User/Password Mgt** | Specifies the class of events dealing with user/password management. |

## EventTypeVocab-1.0 Enumeration

The EventTypeVocab enumeration is the default CybOX vocabulary for Event classes, captured via the EventType class (Type property) in the CybOX Core. The associated enumeration literals are provided in the table below. NOTE: As of CybOX Version 2.1, EventTypeVocab-1.0 is deprecated. Please use version 1.1 instead (see Section **3.7**).

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Account Ops (App Layer)** | Specifies the class of events dealing with account operations at the application layer. |
| **Anomoly[[1]](#endnote-1) Events** | Specifies the class of events dealing with anomaly events. |
| **API Calls** | Specifies the class of events dealing with API calls. |
| **App Layer Traffic** | Specifies the class of events dealing with application layer traffic. |
| **Application Logic** | Specifies the class of events dealing with application logic. |
| **Authentication Ops** | Specifies the class of events dealing with authentication operations. |
| **Authorization (ACL)** | Specifies the class of events dealing with authorization via Access Control Lists (ACL). |
| **Autorun** | Specifies the class of events dealing with autorun. |
| **Auto-update Ops** | Specifies the class of events dealing with auto-update operations. |
| **Basic System Ops** | Specifies the class of events dealing with basic system operations. |
| **Configuration Management** | Specifies the class of events dealing with configuration management. |
| **Data Flow** | Specifies the class of events dealing with data flow. |
| **DHCP** | Specifies the class of events dealing with the Dynamic Host Configuration Protocol (DHCP). |
| **DNS Lookup Ops** | Specifies the class of events dealing with DNS Lookup operations. |
| **Email Ops** | Specifies the class of events dealing with email operations. |
| **File Ops (CRUD)** | Specifies the class of events dealing with file operations. |
| **GUI/KVM** | Specifies the class of events dealing with the GUI/Kernel-based Virtual Machine (KVM). |
| **HTTP Traffic** | Specifies the class of events dealing with HTTP traffic. |
| **IP Ops** | Specifies the class of events dealing with IP operations. |
| **IPC** | Specifies the class of events dealing with thread management. |
| **Memory Ops** | Specifies the class of events dealing with memory operations. |
| **Packet Traffic** | Specifies the class of events dealing with packet traffic. |
| **Port Scan** | Specifies the class of events dealing with port scanning. |
| **Privilege Ops** | Specifies the class of events dealing with privilege operations. |
| **Procedural Compliance** | Specifies the class of events dealing with procedural compliance. |
| **Process Mgt** | Specifies the class of events dealing with process management. |
| **Redirection** | Specifies the class of events dealing with redirection. |
| **Registry Ops** | Specifies the class of events dealing with registry operations. |
| **Service Mgt** | Specifies the class of events dealing with service management. |
| **Session Mgt** | Specifies the class of events dealing with session management. |
| **Signature Detection** | Specifies the class of events dealing with signature detection. |
| **Socket Ops** | Specifies the class of events dealing with thread management. |
| **SQL** | Specifies the class of events dealing with the SQL language. |
| **Technical Compliance** | Specifies the class of events dealing with technical compliance. |
| **Thread Mgt** | Specifies the class of events dealing with thread management. |
| **USB/Media Detection** | Specifies the class of events dealing with USB and/or media detection. |
| **User/Password Mgt** | Specifies the class of events dealing with user/password management. |

## ObjectRelationshipVocab-1.1 Enumeration

The ObjectRelationshipVocab enumeration is the default CybOX vocabulary for Object-Object relationships, captured via the RelatedObjectType class (Relationship property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Allocated** | Specifies that this object allocated the related object. |
| **Allocated\_By** | Specifies that this object was allocated by the related object. |
| **Bound** | Specifies that this object bound the related object. |
| **Bound\_By** | Specifies that this object was bound by the related object. |
| **Characterized\_By** | Specifies that the related object describes the properties of this object. This is most applicable in cases where the related object is a non-Artifact Object and this object is an Artifact Object. |
| **Characterizes** | Specifies that this object describes the properties of the related object. This is most applicable in cases where the related object is an Artifact Object and this object is a non-Artifact Object. |
| **Child\_Of** | Specifies that this object is a child of the related object. |
| **Closed** | Specifies that this object closed the related object. |
| **Closed\_By** | Specifies that this object was closed by the related object. |
| **Compressed** | Specifies that this object compressed the related object. |
| **Compressed\_By** | Specifies that this object was compressed by the related object. |
| **Compressed\_From** | Specifies that this object was compressed from the related object. |
| **Compressed\_Into** | Specifies that this object was compressed into the related object. |
| **Connected\_From** | Specifies that this object was connected to from the related object. |
| **Connected\_To** | Specifies that this object connected to the related object. |
| **Contained\_Within** | Specifies that this object is contained within the related object. |
| **Contains** | Specifies that this object contains the related object. |
| **Copied** | Specifies that this object copied the related object. |
| **Copied\_By** | Specifies that this object was copied by the related object. |
| **Copied\_From** | Specifies that this object was copied from the related object. |
| **Copied\_To** | Specifies that this object was copied to the related object. |
| **Created** | Specifies that this object created the related object. |
| **Created\_By** | Specifies that this object was created by the related object. |
| **Decoded** | Specifies that this object decoded the related object. |
| **Decoded\_By** | Specifies that this object was decoded by the related object. |
| **Decompressed** | Specifies that this object decompressed the related object. |
| **Decompressed\_By** | Specifies that this object was decompressed by the related object. |
| **Decrypted** | Specifies that this object decrypted the related object. |
| **Decrypted\_By** | Specifies that this object was decrypted by the related object. |
| **Deleted** | Specifies that this object deleted the related object. |
| **Deleted\_By** | Specifies that this object was deleted by the related object. |
| **Deleted\_From** | Specifies that this object was deleted from the related object. |
| **Downloaded** | Specifies that this object downloaded the related object. |
| **Downloaded\_By** | Specifies that this object was downloaded by the related object. |
| **Downloaded\_From** | Specifies that this object was downloaded from the related object. |
| **Downloaded\_To** | Specifies that this object downloaded the related object. |
| **Dropped** | Specifies that this object dropped the related object. |
| **Dropped\_By** | Specifies that this object was dropped by the related object. |
| **Encoded** | Specifies that this object encoded the related object. |
| **Encoded\_By** | Specifies that this object was encoded by the related object. |
| **Encrypted** | Specifies that this object encrypted the related object. |
| **Encrypted\_By** | Specifies that this object was encrypted by the related object. |
| **Encrypted\_From** | Specifies that this object was encrypted from the related object. |
| **Encrypted\_To** | Specifies that this object was encrypted to the related object. |
| **Extracted\_From** | Specifies that this object was extracted from the related object. |
| **FQDN\_Of** | Specifies that this object is an FQDN of the related object. |
| **Freed** | Specifies that this object freed the related object. |
| **Freed\_By** | Specifies that this object was freed by the related object. |
| **Hooked** | Specifies that this object hooked the related object. |
| **Hooked\_By** | Specifies that this object was hooked by the related object. |
| **Initialized\_By** | Specifies that this object was initialized by the related object. |
| **Initialized\_To** | Specifies that this object was initialized to the related object. |
| **Injected** | Specifies that this object injected the related object. |
| **Injected\_As** | Specifies that this object injected as the related object. |
| **Injected\_By** | Specifies that this object was injected by the related object. |
| **Injected\_Into** | Specifies that this object injected into the related object. |
| **Installed** | Specifies that this object installed the related object. |
| **Installed\_By** | Specifies that this object was installed by the related object. |
| **Joined** | Specifies that this object joined the related object. |
| **Joined\_By** | Specifies that this object was joined by the related object. |
| **Killed** | Specifies that this object killed the related object. |
| **Killed\_By** | Specifies that this object was killed by the related object. |
| **Listened\_On** | Specifies that this object listened on the related object. |
| **Listened\_On\_By** | Specifies that this object was listened on by the related object. |
| **Loaded\_From** | Specifies that this object was loaded from the related object. |
| **Loaded\_Into** | Specifies that this object loaded into the related object. |
| **Locked** | Specifies that this object locked the related object. |
| **Locked\_By** | Specifies that this object was locked by the related object. |
| **Mapped\_By** | Specifies that this object was mapped by the related object. |
| **Mapped\_Into** | Specifies that this object was mapped into the related object. |
| **Merged** | Specifies that this object merged the related object. |
| **Merged\_By** | Specifies that this object was merged by the related object. |
| **Modified\_Properties\_Of** | Specifies that this object modified the properties of the related object. |
| **Monitored** | Specifies that this object monitored the related object. |
| **Monitored\_By** | Specifies that this object was monitored by the related object. |
| **Moved** | Specifies that this object moved the related object. |
| **Moved\_By** | Specifies that this object was moved by the related object. |
| **Moved\_From** | Specifies that this object was moved from the related object. |
| **Moved\_To** | Specifies that this object was moved to the related object. |
| **Opened** | Specifies that this object opened the related object. |
| **Opened\_By** | Specifies that this object was opened by the related object. |
| **Packed** | Specifies that this object packed the related object. |
| **Packed\_By** | Specifies that this object was packed by the related object. |
| **Packed\_From** | Specifies that this object was packed from the related object. |
| **Packed\_Into** | Specifies that this object was packed into the related object. |
| **Parent\_Of** | Specifies that this object is a parent of the related object. |
| **Paused** | Specifies that this object paused the related object. |
| **Paused\_By** | Specifies that this object was paused by the related object. |
| **Previously\_Contained** | Specifies that this object previously contained the related object. |
| **Properties\_Modified\_By** | Specifies that the properties of this object were modified by the related object. |
| **Properties\_Queried** | Specifies that the object queried properties of the related object. |
| **Properties\_Queried\_By** | Specifies that the properties of this object were queried by the related object. |
| **Read\_From** | Specifies that this object was read from the related object. |
| **Read\_From\_By** | Specifies that this object was read from by the related object. |
| **Received** | Specifies that this object received the related object. |
| **Received\_By** | Specifies that this object was received by the related object. |
| **Received\_From** | Specifies that this object was received from the related object. |
| **Received\_Via\_Upload** | Specifies that this object received the related object via upload. |
| **Redirects\_To** | Specifies that this object redirects to the related object. |
| **Related\_To** | Specifies that this object is related to the related object. |
| **Renamed** | Specifies that this object renamed the related object. |
| **Renamed\_By** | Specifies that this object was renamed by the related object. |
| **Renamed\_From** | Specifies that this object was renamed from the related object. |
| **Renamed\_To** | Specifies that this object was renamed to the related object. |
| **Resolved\_To** | Specifies that this object was resolved to the related object. |
| **Resumed** | Specifies that this object resumed the related object. |
| **Resumed\_By** | Specifies that this object was resumed by the related object. |
| **Root\_Domain\_Of** | Specifies that this object is the root domain of the related object. |
| **Searched\_For** | Specifies that this object searched for the related object. |
| **Searched\_For\_By** | Specifies that this object was searched for by the related object. |
| **Sent** | Specifies that this object sent the related object. |
| **Sent\_By** | Specifies that this object was sent by the related object. |
| **Sent\_To** | Specifies that this object was sent to the related object. |
| **Sent\_Via\_Upload** | Specifies that this object sent the related object via upload. |
| **Set\_From** | Specifies that this object was set from the related object. |
| **Set\_To** | Specifies that this object was set to the related object. |
| **Sub-domain\_Of** | Specifies that this object is a sub-domain of the related object. |
| **Supra-domain\_Of** | Specifies that this object is a supra-domain of the related object. |
| **Suspended** | Specifies that this object suspended the related object. |
| **Suspended\_By** | Specifies that this object was suspended by the related object. |
| **Unhooked** | Specifies that this object unhooked the related object. |
| **Unhooked\_By** | Specifies that this object was unhooked by the related object. |
| **Unlocked** | Specifies that this object unlocked the related object. |
| **Unlocked\_By** | Specifies that this object was unlocked by the related object. |
| **Unpacked** | Specifies that this object unpacked the related object. |
| **Unpacked\_By** | Specifies that this object was unpacked by the related object. |
| **Uploaded** | Specifies that this object uploaded the related object. |
| **Uploaded\_By** | Specifies that this object was uploaded by the related object. |
| **Uploaded\_From** | Specifies that this object was uploaded from the related object. |
| **Uploaded\_To** | Specifies that this object was uploaded to the related object. |
| **Used** | Specifies that this object used the related object. |
| **Used\_By** | Specifies that this object was used by the related object. |
| **Values\_Enumerated** | Specifies that the object enumerated values of the related object. |
| **Values\_Enumerated\_By** | Specifies that the values of the object were enumerated by the related object. |
| **Written\_To\_By** | Specifies that this object was written to by the related object. |
| **Wrote\_To** | Specifies that this object wrote to the related object. |

## ObjectRelationshipVocab-1.0 Enumeration

The ObjectRelationshipVocab enumeration is the default CybOX vocabulary for Object-Object relationships, captured via the RelatedObjectType class (Relationship property) in CybOX Core. The associated enumeration literals are provided in the table below. NOTE: As of CybOX Version 2.1, ObjectRelationshipVocab-1.0 is deprecated. Please use version 1.1 instead (see Section **3.9**).

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Allocated** | Specifies that this object allocated the related object. |
| **Allocated\_By** | Specifies that this object was allocated by the related object. |
| **Bound** | Specifies that this object bound the related object. |
| **Bound\_By** | Specifies that this object was bound by the related object. |
| **Characterized\_By** | Specifies that the related object describes the properties of this object. This is most applicable in cases where the related object is a non-artifact object and this object is an artifact object. |
| **Characterizes** | Specifies that this object describes the properties of the related object. This is most applicable in cases where the related object is an Artifact object and this object is a non-artifact object. |
| **Child\_Of** | Specifies that this object is a child of the related object. |
| **Closed** | Specifies that this object closed the related object. |
| **Closed\_By** | Specifies that this object was closed by the related object. |
| **Compressed** | Specifies that this object compressed the related object. |
| **Compressed\_By** | Specifies that this object was compressed by the related object. |
| **Compressed\_From** | Specifies that this object was compressed from the related object. |
| **Compressed\_Into** | Specifies that this object was compressed into the related object. |
| **Connected\_From** | Specifies that this object was connected to from the related object. |
| **Connected\_To** | Specifies that this object connected to the related object. |
| **Contained\_Within** | Specifies that this object is contained within the related object. |
| **Contains** | Specifies that this object contains the related object. |
| **Copied** | Specifies that this object copied the related object. |
| **Copied\_By** | Specifies that this object was copied by the related object. |
| **Copied\_From** | Specifies that this object was copied from the related object. |
| **Copied\_To** | Specifies that this object was copied to the related object. |
| **Created** | Specifies that this object created the related object. |
| **Created\_By** | Specifies that this object was created by the related object. |
| **Decoded** | Specifies that this object decoded the related object. |
| **Decoded\_By** | Specifies that this object was decoded by the related object. |
| **Decompressed** | Specifies that this object decompressed the related object. |
| **Decompressed\_By** | Specifies that this object was decompressed by the related object. |
| **Decrypted** | Specifies that this object decrypted the related object. |
| **Decrypted\_By** | Specifies that this object was decrypted by the related object. |
| **Deleted** | Specifies that this object deleted the related object. |
| **Deleted\_By** | Specifies that this object was deleted by the related object. |
| **Deleted\_From** | Specifies that this object was deleted from the related object. |
| **Downloaded** | Specifies that this object downloaded the related object. |
| **Downloaded\_By** | Specifies that this object was downloaded by the related object. |
| **Downloaded\_From** | Specifies that this object was downloaded from the related object. |
| **Downloaded\_To** | Specifies that this object downloaded the related object. |
| **Dropped** | Specifies that this object dropped the related object. |
| **Dropped\_By** | Specifies that this object was dropped by the related object. |
| **Encoded** | Specifies that this object encoded the related object. |
| **Encoded\_By** | Specifies that this object was encoded by the related object. |
| **Encrypted** | Specifies that this object encrypted the related object. |
| **Encrypted\_By** | Specifies that this object was encrypted by the related object. |
| **Encrypted\_From** | Specifies that this object was encrypted from the related object. |
| **Encrypted\_To** | Specifies that this object was encrypted to the related object. |
| **Extracted\_From** | Specifies that this object was extracted from the related object. |
| **FQDN\_Of** | Specifies that this object is an FQDN of the related object. |
| **Freed** | Specifies that this object freed the related object. |
| **Freed\_By** | Specifies that this object was freed by the related object. |
| **Hooked** | Specifies that this object hooked the related object. |
| **Hooked\_By** | Specifies that this object was hooked by the related object. |
| **Initialized\_By** | Specifies that this object was initialized by the related object. |
| **Initialized\_To** | Specifies that this object was initialized to the related object. |
| **Injected** | Specifies that this object injected the related object. |
| **Injected\_As** | Specifies that this object injected as the related object. |
| **Injected\_By** | Specifies that this object was injected by the related object. |
| **Injected\_Into** | Specifies that this object injected into the related object. |
| **Installed** | Specifies that this object installed the related object. |
| **Installed\_By** | Specifies that this object was installed by the related object. |
| **Joined** | Specifies that this object joined the related object. |
| **Joined\_By** | Specifies that this object was joined by the related object. |
| **Killed** | Specifies that this object killed the related object. |
| **Killed\_By** | Specifies that this object was killed by the related object. |
| **Listened\_On** | Specifies that this object listened on the related object. |
| **Listened\_On\_By** | Specifies that this object was listened on by the related object. |
| **Loaded\_From** | Specifies that this object was loaded from the related object. |
| **Loaded\_Into** | Specifies that this object loaded into the related object. |
| **Locked** | Specifies that this object locked the related object. |
| **Locked\_By** | Specifies that this object was locked by the related object. |
| **Mapped\_By** | Specifies that this object was mapped by the related object. |
| **Mapped\_Into** | Specifies that this object was mapped into the related object. |
| **Merged** | Specifies that this object merged the related object. |
| **Merged\_By** | Specifies that this object was merged by the related object. |
| **Modified\_Properties\_Of** | Specifies that this object modified the properties of the related object. |
| **Monitored** | Specifies that this object monitored the related object. |
| **Monitored\_By** | Specifies that this object was monitored by the related object. |
| **Moved** | Specifies that this object moved the related object. |
| **Moved\_By** | Specifies that this object was moved by the related object. |
| **Moved\_From** | Specifies that this object was moved from the related object. |
| **Moved\_To** | Specifies that this object was moved to the related object. |
| **Opened** | Specifies that this object opened the related object. |
| **Opened\_By** | Specifies that this object was opened by the related object. |
| **Packed** | Specifies that this object packed the related object. |
| **Packed\_By** | Specifies that this object was packed by the related object. |
| **Packed\_From** | Specifies that this object was packed from the related object. |
| **Packed\_Into** | Specifies that this object was packed into the related object. |
| **Parent\_Of** | Specifies that this object is a parent of the related object. |
| **Paused** | Specifies that this object paused the related object. |
| **Paused\_By** | Specifies that this object was paused by the related object. |
| **Previously\_Contained** | Specifies that this object previously contained the related object. |
| **Properties\_Modified\_By** | Specifies that the properties of this object were modified by the related object. |
| **Properties\_Queried** | Specifies that the object queried properties of the related object. |
| **Properties\_Queried\_By** | Specifies that the properties of this object were queried by the related object. |
| **Read\_From** | Specifies that this object was read from the related object. |
| **Read\_From\_By** | Specifies that this object was read from by the related object. |
| **Received** | Specifies that this object received the related object. |
| **Received\_By** | Specifies that this object was received by the related object. |
| **Received\_From** | Specifies that this object was received from the related object. |
| **Received\_Via\_Upload** | Specifies that this object received the related object via upload. |
| **Related\_To** | Specifies that this object is related to the related object. |
| **Renamed** | Specifies that this object renamed the related object. |
| **Renamed\_By** | Specifies that this object was renamed by the related object. |
| **Renamed\_From** | Specifies that this object was renamed from the related object. |
| **Renamed\_To** | Specifies that this object was renamed to the related object. |
| **Resolved\_To** | Specifies that this object was resolved to the related object. |
| **Resumed** | Specifies that this object resumed the related object. |
| **Resumed\_By** | Specifies that this object was resumed by the related object. |
| **Root\_Domain\_Of** | Specifies that this object is the root domain of the related object. |
| **Searched\_For** | Specifies that this object searched for the related object. |
| **Searched\_For\_By** | Specifies that this object was searched for by the related object. |
| **Sent** | Specifies that this object sent the related object. |
| **Sent\_By** | Specifies that this object was sent by the related object. |
| **Sent\_To** | Specifies that this object was sent to the related object. |
| **Sent\_Via\_Upload** | Specifies that this object sent the related object via upload. |
| **Set\_From** | Specifies that this object was set from the related object. |
| **Set\_To** | Specifies that this object was set to the related object. |
| **Sub-domain\_Of** | Specifies that this object is a sub-domain of the related object. |
| **Supra-domain\_Of** | Specifies that this object is a supra-domain of the related object. |
| **Suspended** | Specifies that this object suspended the related object. |
| **Suspended\_By** | Specifies that this object was suspended by the related object. |
| **Unhooked** | Specifies that this object unhooked the related object. |
| **Unhooked\_By** | Specifies that this object was unhooked by the related object. |
| **Unlocked** | Specifies that this object unlocked the related object. |
| **Unlocked\_By** | Specifies that this object was unlocked by the related object. |
| **Unpacked** | Specifies that this object unpacked the related object. |
| **Unpacked\_By** | Specifies that this object was unpacked by the related object. |
| **Uploaded** | Specifies that this object uploaded the related object. |
| **Uploaded\_By** | Specifies that this object was uploaded by the related object. |
| **Uploaded\_From** | Specifies that this object was uploaded from the related object. |
| **Uploaded\_To** | Specifies that this object was uploaded to the related object. |
| **Values\_Enumerated** | Specifies that the object enumerated values of the related object. |
| **Values\_Enumerated\_By** | Specifies that the values of the object were enumerated by the related object. |
| **Written\_To\_By** | Specifies that this object was written to by the related object. |
| **Wrote\_To** | Specifies that this object wrote to the related object. |

## ObjectStateVocab-1.0 Enumeration

The ObjectStateVocab enumeration is the default CybOX vocabulary for Object states, captured via the ObjectType class (State property) in CybOX Core. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Active** | Specifies that the object is active. |
| **Closed** | Specifies that the object is closed. |
| **Does Not Exist** | Specifies that the object does not exist. |
| **Exists** | Specifies that the object exists. |
| **Inactive** | Specifies that the object is inactive. |
| **Locked** | Specifies that the object is locked. |
| **Open** | Specifies that the object is open. |
| **Started** | Specifies that the object has started. |
| **Stopped** | Specifies that the object has stopped. |
| **Unlocked** | Specifies that the object is unlocked. |

## CharacterEncodingVocab-1.0 Enumeration

The CharacterEncodingVocab enumeration is the default CybOX vocabulary for character encoding, used in the ExtractedStringType class (Encoding property) in CybOX Common. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **ASCII** | Specifies the American Standard Code for Information Interchange (ASCII) character encoding scheme. |
| **UTF-8** | Specifies the UCS Transformation Format-8 bit (UTF-8) character encoding scheme. |
| **UTF-16** | Specifies the UCS Transformation Format-16 bit (UTF-16) character encoding scheme. |
| **UTF-32** | Specifies the UCS Transformation Format-32 bit (UTF-32) character encoding scheme. |
| **Windows-1250** | Specifies the Windows-1250 character encoding scheme, for Central European languages. |
| **Windows-1251** | Specifies the Windows-1251 character encoding scheme, for Cyrillic alphabets. |
| **Windows-1252** | Specifies the Windows-1252 character encoding scheme, for Western languages. |
| **Windows-1253** | Specifies the Windows-1253 character encoding scheme, for Greek. |
| **Windows-1254** | Specifies the Windows-1254 character encoding scheme, for Turkish. |
| **Windows-1255** | Specifies the Windows-1255 character encoding scheme, for Hebrew. |
| **Windows-1256** | Specifies the Windows-1256 character encoding scheme, for Arabic. |
| **Windows-1257** | Specifies the Windows-1257 character encoding scheme, for Baltic languages. |
| **Windows-1258** | Specifies the Windows-1258 character encoding scheme, for Vietnamese. |

## InformationSourceTypeVocab-1.0 Enumeration

The InformationSourceTypeVocab enumeration is the default CybOX vocabulary for information source classes, used in the MeasureSourceType class (Information\_Source\_Type property) in CybOX Common. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Application Framework** | Specifies a cyber observation coming from an application framework. |
| **Application Logs** | Specifies a cyber observation coming from application logs. |
| **Comm Logs** | Specifies a cyber observation coming from communications logs. |
| **DBMS Log** | Specifies a cyber observation coming from the DBMS log. |
| **Frameworks** | Specifies a cyber observation coming from frameworks. |
| **Help Desk** | Specifies a cyber observation coming from a human or automated help desk. |
| **IAVM** | Specifies a cyber observation made using information provided by The information assurance vulnerability management (IAVM) mechanisms. |
| **Incident Management** | Specifies a cyber observation made using information provided by Incident Management services. |
| **OS/Device Driver APIs** | Specifies a cyber observation coming from OS/Device Driver APIs. |
| **TPM** | Specifies a cyber observation made using TPM output data. |
| **VM Hypervisor** | Specifies a cyber observation coming from the VM hypervisor data. |
| **Web Logs** | Specifies a cyber observation coming from web logs. |

## HashNameVocab-1.0 Enumeration

The HashNameVocab enumeration is the default CybOX vocabulary for hashing algorithm names, used in the HashType class (Type property) in CybOX Common. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **MD5** | The MD5 value specifies the MD5 hashing algorithm. |
| **MD6** | The MD6 value specifies the MD6 hashing algorithm. |
| **SHA1** | The SHA1 value specifies the SHA1 hashing algorithm. |
| **SHA224** | The SHA24 value specifies the SHA224 hashing algorithm. |
| **SHA256** | The SHA256 value specifies the SHA256 hashing algorithm. |
| **SHA384** | The SHA384 value specifies the SHA384 hashing algorithm. |
| **SHA512** | The SHA512 value specifies the SHA512 hashing algorithm. |
| **SSDEEP** | The SSDEEP value specifies the SSDEEP hashing algorithm. |

## ToolTypeVocab-1.1 Enumeration

The ToolTypeVocab enumeration is the default CybOX vocabulary for tool classes, used in the ToolInformationType class (Type property) in CybOX Common. The associated enumeration literals are provided in the table below.

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **Asset Scanner** | Specifies an asset scanner tool. |
| **AV** | Specifies an anti-virus (AV) tools and/or software. |
| **Configuration Scanner** | Specifies a configuration scanner tool. |
| **DBMS Monitor** | Specifies a Database Management System (DBMS) monitor tool. |
| **Digital Forensics** | Specifies a digital forensics tool. |
| **Dynamic Malware Analysis** | Specifies a dynamic malware Analysis tool. |
| **Firewall** | Specifies a software or hardware firewall. |
| **Gateway** | Specifies a cyber observation made using a software or hardware network gateway. |
| **HIDS** | Specifies a Host-based Intrusion Detection System (HIDS) tool. |
| **HIPS** | Specifies a Host-based Intrusion Protection System (HIPS) tool. |
| **Intelligence Service Platform** | Specifies an intelligence service platform tool. |
| **Network Configuration Management Tool** | Specifies a network configuration management tool. |
| **Network Flow Capture and Analysis** | Specifies a network flow capture and analysis tool. |
| **NIDS** | Specifies a Network Intrusion Detection System (NIDS) tool. |
| **NIPS** | Specifies a Network Intrusion Protection System (NIPS) tool. |
| **Packet Capture and Analysis** | Specifies a packet capture and analysis tool. |
| **Proxy** | Specifies a cyber observation made using a software or hardware network proxy. |
| **Router** | Specifies a software or hardware router. |
| **SEM** | Specifies a Security Event Management (SEM) tool. |
| **SIM** | Specifies a Security Information Management (SIM) tool. |
| **SNMP/MIBs** | Specifies a SNMP or MIBs (Simple Network Management Protocol or Management Information Base) tool. |
| **Static Malware Analysis** | Specifies a static malware analysis tool. |
| **System Configuration Management Tool** | Specifies a system configuration management tool. |
| **Vulnerability Scanner** | The vulnerability scanner value specifies a vulnerability scanner tool. |

## ToolTypeVocab-1.0 Enumeration

The ToolTypeVocab enumeration is the default CybOX vocabulary for tool class, used in the ToolInformationType class (Type property) in CybOX Common. The associated enumeration literals are provided in the table below. NOTE: As of CybOX Version 2.1, ToolTypeVocab-1.0 is deprecated. Please use version 1.1 instead (see Section **3.15**).

|  |  |
| --- | --- |
| **Enumeration Literal** | **Description** |
| **A/V** | Specifies an anti-virus (AV) tools and/or software. |
| **Asset Scanner** | Specifies an asset scanner tool. |
| **Configuration Scanner** | Specifies a configuration scanner tool. |
| **DBMS Monitor** | Specifies a Database Management System (DBMS) monitor tool. |
| **Firewall** | Specifies a software or hardware firewall. |
| **Gateway** | Specifies a cyber observation made using a software or hardware network gateway. |
| **HIDS** | Specifies a Host-based Intrusion Detection System (HIDS) tool. |
| **HIPS** | Specifies a Host-based Intrusion Protection System (HIPS) tool. |
| **NIDS** | Specifies a Network Intrusion Detection System (NIDS) tool. |
| **NIPS** | Specifies a Network Intrusion Protection System (NIPS) tool. |
| **Proxy** | The proxy value specifies a cyber observation made using a network proxy. |
| **Router** | The router value specifies a cyber observation made using a router. |
| **SEM** | Specifies a Security Event Management (SEM) tool. |
| **SIM** | Specifies a Security Information Management (SIM) tool. |
| **SNMP/MIBs** | Specifies a SNMP or MIBs (Simple Network Management Protocol or Management Information Base) tool. |
| **Vulnerability Scanner** | The vulnerability scanner value specifies a cyber observation made using a vulnerability scanner. |

# Conformance

Implementations have discretion over which parts (components, properties, extensions, controlled vocabularies, etc.) of CybOX they implement (e.g., Observable/Object).

[1] Conformant implementations must conform to all normative structural specifications of the UML model or additional normative statements within this document that apply to the portions of CybOX they implement (e.g., implementers of the entire Observable class must conform to all normative structural specifications of the UML model regarding the Observable class, and to additional normative statements contained in the document that describes the Observable class).

[2] Conformant implementations are free to ignore normative structural specifications of the UML model or additional normative statements within this document that do not apply to the portions of CybOX they implement (e.g., non-implementers of any particular properties of the Observable class are free to ignore all normative structural specifications of the UML model regarding those properties of the Observable class, and any additional normative statements contained in the document that describes the Observable class).

The conformance section of this document is intentionally broad and attempts to reiterate what already exists in this document.

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1. Corrected in EventTypeVocab-1.0.1 [↑](#endnote-ref-1)