DOCUMENT

Taxonomy Formula: [tN{~d,t,s,e,b}+phFile]

Token Specification Summary

Token Classification

Template Type:	SingleToken	This token has no sub or child tokens.
Token Type:	NonFungible	This token is not interchangeable with other tokens of the same type as they have different values.
Token Unit:	Singleton	There is only one instance of this token and it cannot be subdivided.
Value Type:	Intrinsic	This token is purely a digital token represents value directly, it represents no external physical form and cannot be a receipt or title for a material item or property.
Representation Type:	Common	This token is simply represented as a balance or quantity attributed to an owner address where all the balances are recorded on the same balance sheet, like a bank account. All instances can easily share common properties and locating them is simple.

Used to represent a document that may be a scanned or PDF printed document. It records the document hash to check for tampering, a file path to fetch the file from storage as well as the ability to be encumbered. Implements the File property-set.

Example

For example: you may choose to create an invoice token from an invoice document. You can then allow another token or contract representing a loan or proof of financing to encumber the document establishing a link between the two.

Analogies

Name	Description

Scanned Document	A scanned copy of a certificate, like a diploma or industry certification

Document is:

- Singleton
- Non-Subdividable
- Transferable
- Burnable
- Encumberable

Document Details

Singleton

Type:	**Base**
Name:	Singleton
Id:	53101d87-3c93-4d8b-ab39-1e629406d062
Visual:	&tau_N{s}
Tooling:	tN{s}
Version:	1.0

Definition

A restriction on the token in that there can only be 1 whole token in the class and is not subdividable. This behavior is only available to non-fungible base types. By definition, a Singleton cannot be mintable.

Example

CryptoKitties, Art, Reserved Seat for an event.

Analogies

Name	**Description**
Property Title	The physical property title, land for example, have the identical look and feel from the paper, colors and seal. The difference between them are the values like property address, plot numbers, etc. These values make the title unique. There

	are some properties on a class of titles that are the same, like the county or jurisdiction the property is in. For titles that have some shared values and unique values, it may make more sense to define them in the same class.
Art	The valuable painting or other unique piece of art may not share any property values with other paintings, unless the artist is extremely prolific in generating tens of thousands of pieces of art, it would make sense to define each piece of art as its own class. Meaning there would be only a single piece of art represented by the token class. If the art cannot be sub-divided, meaning there can be no fractional owners, this token class can be a singleton if the quantity in the class is set to 1. A singleton has only one instance in the class, essentially meaning the class is the instance, and not be sub-dividable and no new tokens can be minted in the class.

Comments

Non-fungible tokens require additional thought about how these tokens may or may not be grouped together in the same class.

Dependencies

Artifact Type	Symbol	Description
Base	t	Base Token Definition
Behavior	~d	non-subdividable

Incompatible With

Artifact Type	Symbol	Id
Behavior	d	6e3501dc-5800-4c71-b59e-ad11418a998c
Behavior	m	f9224e90-3cab-45bf-b5dc-0175121e2ead

Influenced By

Description	Symbol	Applies To

Artifact Files

Content Type	File Name	File Content
Control	singleton.proto	
Uml	singleton.md	

Code Map

Map Type	Name	Platform	Location

Implementation Map

Map Type	Name	Platform	Location

Resource Map

Map Type	Name	Location	Description

Base Details

Token Name:	
Token Type:	NonFungible
Representation Type:	Common
Value Type:	Intrinsic
Token Unit:	Singleton
Symbol:	
Owner:	
Quantity:	1
Decimals:	0
Constructor Name:	Constructor

Behaviors

Singleton

Type:	Behavior
Name:	Singleton
Id:	c1189d7a-e142-4504-bf26-44c35b76c9d6
Visual:	s
Tooling:	s
Version:	1.0

Definition

A restriction on the token in that there can only be 1 whole token in the class and is not subdividable. This behavior is only available to non-fungible base types. By definition, a Singleton cannot be mintable.

Example

Analogies

Name	Description
Analogy 1	singleton analogy 1 description

Dependencies

Artifact Type	Symbol	Description
Base	tN	Singleton must be have a non-fungible base.
Behavior	~d	Singleton requires non-sub-dividable.

Incompatible With

Artifact Type	Symbol	Id
Behavior	d	6e3501dc-5800-4c71-b59e-ad11418a998c

Behavior	m	f9224e90-3cab-45bf-b5dc-0175121e2ead

Influenced By

Description	Symbol	Applies To

Artifact Files

Content Type	File Name	File Content
Control	singleton.proto	
Uml	singleton.md	

Code Map

Map Type	Name	Platform	Location
SourceCode	Code 1	Daml	

Implementation Map

Map Type	Name	Platform	Location
Implementation	Implementation 1	ChaincodeGo	

Resource Map

Map Type	Name	Location	Description
Resource	Regulation Reference 1		

Specification Behavior

Singleton

Taxonomy Symbol: s

A restriction on the token in that there can only be 1 whole token in the class and is not subdividable. This behavior is only available to non-fungible base types. By definition, a Singleton cannot be mintable.

Example

Analogies

Name	Description
Analogy 1	singleton analogy 1 description

Is External:	True
Constructor:	

Singleton responds to these Invocations

Properties

Non-Subdividable

Type:	Behavior
Name:	Non-Subdividable
Id:	d5807a8e-879b-4885-95fa-f09ba2a22172
Visual:	~d
Tooling:	~d
Version:	1.0

Definition

An ability or restriction on the token where it cannot be subdivided from a single whole token into fractions. Sets the base token Decimals property to 0 which will make the token non-sub-dividable and a whole token is the smallest ownable unit of the token.

Example

Non-subdividable is common for items where subdivision does not make sense, like a property title, inventory item or invoice.

Analogies

Name	Description
Non-Fractional	It is not possible to own a fraction of this token.
Barrel of Oil	Barrels of Oil don't make sense to subdivide.

Dependencies

Artifact Type	Symbol	Description

Incompatible With

Artifact Type	Symbol	Id
Behavior	d	6e3501dc-5800-4c71-b59e-ad11418a998c

Influenced By

Description	Symbol	Applies To

Artifact Files

Content Type	File Name	File Content
Control	non-subdividable.proto	

Uml	non-subdividable.md	

Code Map

Map Type	Name	Platform	Location
SourceCode	Code 1	Daml	

Implementation Map

Map Type	Name	Platform	Location
Implementation	Implementation 1	ChaincodeGo	

Resource Map

Map Type	Name	Location	Description
Resource	Regulation Reference 1		

Specification Behavior

Non-Subdividable

Taxonomy Symbol: ~d

> *An ability or restriction on the token where it cannot be subdivided from a single whole token into fractions. Sets the base token Decimals property to 0 which will make the token non-sub-dividable and a whole token is the smallest ownable unit of the token.*

Example

Non-subdividable is common for items where subdivision does not make sense, like a property title, inventory item or invoice.

Analogies

Name	Description
Non-Fractional	It is not possible to own a fraction of this token.
Barrel of Oil	Barrels of Oil don't make sense to subdivide.

Is External:	True
Constructor:	

Non-Subdividable responds to these Invocations

Properties

Name: Decimals

Value Description: Set to Zero, not allowing any subdivision

Template Value: 0

Invocations

GetDecimals

Id: 2ca7fbb2-ce98-4dda-a6ae-e4ac2527bb33

Description: Should return 0

Request

Control Message: GetDecimalsRequest

Description:

Parameters

Name	Value

Response

Control Message: GetDecimalsResponse

Description: Return 0

Parameters

Name	Value
Decimals	0

GetDecimals

Id: 2ca7fbb2-ce98-4dda-a6ae-e4ac2527bb33

Description: Should return 0

Request

Control Message: GetDecimalsRequest

Description:

Parameters

Name	Value

Response

Control Message: GetDecimalsResponse

Description: Return 0

Parameters

Name	Value
Decimals	0

Properties

Transferable

Type:	Behavior
Name:	Transferable
Id:	af119e58-6d84-4ca6-9656-75e8d312f038
Visual:	t
Tooling:	t

Version:	1.0

Definition

Every token instance has an owner. The Transferable behavior provides the owner the ability to transfer the ownership to another party or account. This behavior is often inferred by other behaviors that might exist like Redeem, Sell, etc. This behavior is Delegable. If the token definition is Delegable, TransferFrom will be available.

Example

Analogies

Name	Description
Analogy 1	transferable analogy 1 description

Dependencies

Artifact Type	Symbol	Description

Incompatible With

Artifact Type	Symbol	Id
Behavior	~t	a4fa4ca8-6afd-452b-91f5-7103b6fee5e5

Influenced By

Description	Symbol	Applies To
If the token is Delegable, TransferFrom should be enabled.	g	[ ]
If Compliance is present, a CheckTransferAllowed request has to be made and verified before a Transfer request or a TransferFrom request.	c	[ ]

Artifact Files

Content Type	File Name	File Content
Control	transferable.proto	
Uml	transferable.md	

Code Map

Map Type	Name	Platform	Location
SourceCode	Code 1	Daml	

Implementation Map

Map Type	Name	Platform	Location
Implementation	Implementation 1	ChaincodeGo	

Resource Map

Map Type	Name	Location	Description
Resource	Regulation Reference 1		

Specification Behavior

Transferable

Taxonomy Symbol: t

Every token instance has an owner. The Transferable behavior provides the owner the ability to transfer the ownership to another party or account. This behavior is often inferred by other behaviors that might exist like Redeem, Sell,

etc. This behavior is Delegable. If the token definition is Delegable, TransferFrom will be available.

Example

Analogies

Name	Description
Analogy 1	transferable analogy 1 description

Is External:	True
Constructor:	

Transferable responds to these Invocations

Transfer

Id: 5d4b8f10-7857-4a2f-9b8c-d61e367a6bcc

Description: >A transfer request will invoke a transfer from the owner of the token to the party or account provided in the To field of the request. For fungible or subdividable non-fungible tokens, this request may also include value in the Amount field of the request to transfer more than one token of the class in a single request.

Request Message:

TransferRequest

Description: The request

Request Parameters

Name	Value
To	AccountId to transfer ownership to.
Quantity	Number of tokens to transfer.

Response Message

TransferResponse

Description: The response

Response Parameters

Name	Value
Confirmation	A confirmation receipt or error may be returned to the owner based on the outcome of the transfer request.

TransferFrom

Id: 516b4e2f-4a14-4c4f-a6f2-1419d4af35c6

Description: >A transfer request will invoke a transfer from the owner of the token to the party or account provided in the To field of the request. For fungible or subdividable non-fungible tokens, this request may also include value in the Amount field of the request to transfer more than one token of the class in a single request.

Request Message:

TransferFromRequest

Description: The request

Request Parameters

Name	Value
From	AccountId to transfer ownership from.
To	AccountId to transfer ownership to.
Quantity	Number of tokens to transfer.

Response Message

TransferFromResponse

Description: The response

Response Parameters

Name	Value
Confirmation	A confirmation receipt or error may be returned to the owner based on the outcome of the transfer from request.

Properties

Burnable

Type:	Behavior
Name:	Burnable
Id:	803297a1-c0f9-4898-9d44-29c9d41cca97
Visual:	b
Tooling:	b
Version:	1.0

Definition

A token class that implements this behavior will support the burning or decommissioning of token instances of the class. This does not delete a token, but rather places it in a permanent non-use state. Burning is a one way operation and cannot be reversed. This behavior is Delegable. If the token definition is Delegable, BurnFrom will be available.

Example

When a token is used in a certain way, you may want to remove it from circulation or from being used again. Since the ledger doesn't allow for deletions, burning a token essentially 'deletes' the token from being used, but not from history.

Analogies

Name	Description
Oil Barrels	If you mint a new token for each barrel of oil created, you may transfer ownership several times until the barrel is refined. The refining process should burn the barrel of oil to remove it from circulation.
Redeem	A token that is a coupon or single use ticket, should be burned when it is redeemed.

Dependencies

Artifact Type	Symbol	Description

Incompatible With

Artifact Type	Symbol	Id

Influenced By

Description	Symbol	Applies To
Delegable or not, will determine if the BurnFrom Control will be available in the implementation.	g	[ ]
If Compliance is present, a CheckBurnAllowed request has to be made and verified before a Burn request or a BurnFrom request.	c	[ ]

Artifact Files

Content Type	File Name	File Content
Control	burnable.proto	
Uml	burnable.md	

Code Map

Map Type	Name	Platform	Location
SourceCode	OpenZeppelin	EthereumSolidity	https://github.com/OpenZeppelin/openzeppelin-contracts/blob/master/contracts/token/ERC20/ERC20Burnable.sol

Implementation Map

Map Type	Name	Platform	Location

Resource Map

Map Type	Name	Location	Description
Resource	Regulation Reference 1		

Specification Behavior

Burnable

Taxonomy Symbol: b

A token class that implements this behavior will support the burning or decommissioning of token instances of the class. This does not delete a token, but rather places it in a permanent non-use state. Burning is a one way operation and cannot be reversed. This behavior is Delegable. If the token definition is Delegable, BurnFrom will be available.

Example

When a token is used in a certain way, you may want to remove it from circulation or from being used again. Since the ledger doesn't allow for deletions, burning a token essentially 'deletes' the token from being used, but not from history.

Analogies

Name	Description
Oil Barrels	If you mint a new token for each barrel of oil created, you may transfer ownership several times until the barrel is refined. The refining process should burn the barrel of oil to remove it from circulation.
Redeem	A token that is a coupon or single use ticket, should be burned when it is redeemed.

Is External:	True
Constructor:	

Burnable responds to these Invocations

Burn

Id: f063dcaa-49f9-4c49-bf0f-2766301e1033

Description: A request to burn a token instance(s) in the class by the owner of the token instance(s). Optional Quantity field in the request.

Request Message:

BurnRequest

Description: The request to Burn or Retire tokens.

Request Parameters

Name	Value
Quantity	The number of tokens to burn, might not apply to the implementation.

Response Message

BurnResponse

Description: The response from the request to burn.

Response Parameters

Name	Value
Confirmation	A confirmation receipt or error may be returned to the invoker based on the outcome of the burn request

BurnFrom

Id: 49b53152-3360-426f-9e0a-24a0b4e7c881

Description: Requires Delegable. A request to burn token instance(s) in the class by a party or account that has allowance to do so. Requires a From and Quantity fields in the request.

Request Message:

BurnFromRequest

Description: The request to Burn or Retire tokens.

Request Parameters

Name	Value
From	AccountId from which tokens are burnt
Quantity	The number of tokens to burn, might not apply to the implementation.

Response Message

BurnFromResponse

Description: The response from the request to burn.

Response Parameters

Name	Value
Confirmation	A confirmation receipt or error may be returned to the invoker based on the outcome of the burn from request

Properties

Encumberable

Type:	Behavior
Name:	Encumberable
Id:	dc8d5961-59e8-4a10-8b38-d9e99394d251
Visual:	e
Tooling:	e
Version:	1.0

Definition

A token class that implements this behavior will have restrictions preventing certain behaviors like transferable, burnable, etc. from working while it is encumbered. The encumbering party should make a request to encumber, the owner should be notified about the request, and accept the request, which will

finalize the encumbrance and send the EncumberResponse message to the requestor.

Example

For example, a property title's owner may have obtained a loan from a bank to purchase the property. The loan represents a contract between the owner of the property and the bank, this loan encumbers the property title preventing the owner from being able to sell the property, transferable, to another party until the loan is paid off. Paying off the loan will remove the encumber, which will allow transferable to be invoked.

Analogies

Name	Description
Loan	A token can represent an asset that the owner took out a loan to obtain. If so, the token will need to be encumbered by the loan contract preventing the owner from selling the asset until the loan is repaid.

Comments

The token definition should have a Encumbered property or structure that may allow only one encumber or allow multiple.

Dependencies

Artifact Type	Symbol	Description

Incompatible With

Artifact Type	Symbol	Id

Influenced By

Description	Symbol	Applies To

Artifact Files

Content Type	File Name	File Content

Control	encumberable.proto	
Uml	encumberable.md	

Code Map

Map Type	Name	Platform	Location
SourceCode	Code 1	Daml	

Implementation Map

Map Type	Name	Platform	Location
Implementation	Implementation 1	ChaincodeGo	

Resource Map

Map Type	Name	Location	Description
Resource	Regulation Reference 1		

Specification Behavior

Encumberable

Taxonomy Symbol: e

A token class that implements this behavior will have restrictions preventing certain behaviors like transferable, burnable, etc. from working while it is encumbered. The encumbering party should make a request to encumber, the owner should be notified about the request, and accept the request, which will finalize the encumbrance and send the EncumberResponse message to the requestor.

Example

For example, a property title's owner may have obtained a loan from a bank to purchase the property. The loan represents a contract between the owner of the property and the bank, this loan encumbers the property title preventing the owner from being able to sell the property, transferable, to another party until the loan is paid off. Paying off the loan will remove the encumber, which will allow transferable to be invoked.

Analogies

Name	Description
Loan	A token can represent an asset that the owner took out a loan to obtain. If so, the token will need to be encumbered by the loan contract preventing the owner from selling the asset until the loan is repaid.

Comments

The token definition should have a Encumbered property or structure that may allow only one encumber or allow multiple.

Is External:	True
Constructor:	

Encumberable responds to these Invocations

EncumberRequest

Id: bdc69e47-8320-4f54-8a03-0f54c376e113

Description: A Request by a party or account, perhaps a contract or another token, to encumber the token.

Request Message:

EncumberRequest

Description: The request

Request Parameters

Name	Value
Name of Encumber	Name of the institution requesting the encumber.
Identifier	A public key or address for the requestor.
Signature	A digital signature or attestation, optional.

Response Message

EncumberResponse

Description: The response

Response Parameters

Name	Value
Confirmation	A confirmation response from the token for the encumber request.

AcceptEncumberRequest

Id: efd8bb57-4904-481e-976d-8a20a33df602

Description: A Request by a party or account, perhaps a contract or another token, to encumber the token. Once accepted, the token should add a new entry into the Encumbrances property.

Request Message:

AcceptEncumberRequest

Description: The request

Request Parameters

Name	Value

Response Message

AcceptEncumberResponse

Description: The response

Response Parameters

Name	Value
Confirmation	A confirmation response returned to the owner of their acceptance.

RemoveEncumberRequest

Id: 4532c466-bb6d-482a-b2cc-5285ba1f8259

Description: A Request by encumbrancer, perhaps a contract or another token, to remove their encumber or lien from the token. Which should remove any restrictions from behaviors if there are no more encumbers. Only the owner of the encumber can remove their encumber.

Request Message:

RemoveEncumberRequest

Description: The request

Request Parameters

Name	Value

Response Message

RemoveEncumberResponse

Description: The response

Response Parameters

Name	Value
Confirmation	A confirmation receipt or denial be returned to the RemoveEncumber requestor.

Properties

Name: Encumbrances

Value Description: List of Encumbered

Template Value:

Invocations

GetEncumbrancesRequest

Id: 9e39bf6a-74dc-4ca1-a709-5db247aaa31b

Description: The property value.

Request

Control Message: GetEncumbrancesRequest

Description:

Parameters

Name	Value

Response

Control Message: GetEncumbrancesResponse

Description: Return value

Parameters

Name	Value
Encumbrances	List of Encumbered

Properties

Name: Encumbered

Value Description: True or False

Template Value:

Invocations

GetEncumberedRequest

Id: f35cdfee-d2f4-4a01-bf9b-33774b5df241

Description: The property value.

Request

Control Message: GetEncumberedRequest

Description:

Parameters

Name	Value

Response

Control Message: GetEncumberedResponse

Description: Return value

Parameters

Name	Value
Encumbered	True or False

Properties