Foundry TypeScript Cheat Sheet

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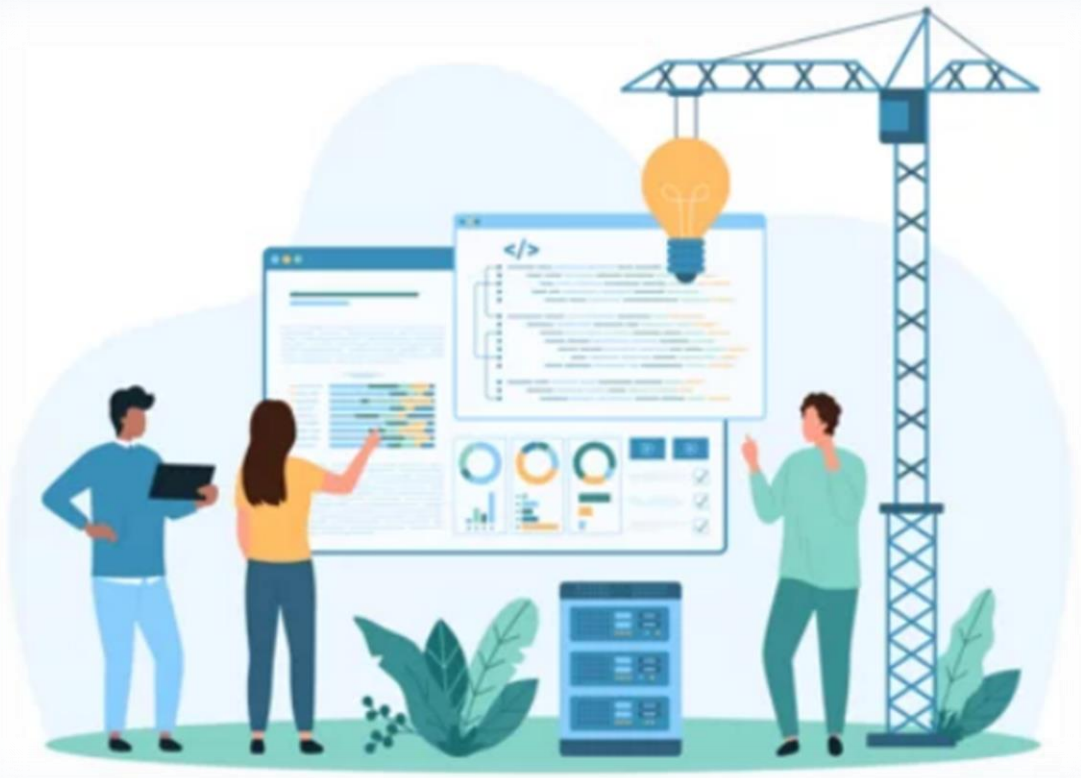

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IMPORT

Imports allow you to bring code, functions, classes, or modules from another file or library into the current code file.

ONTOLOGY API

```
import {X} from "@foundry/ontology-api";
```

Based on what you wish to import, 'X' in the above code snippet may be:

- Objects
- ObjectSet
- ObjectType

***Note**: This applies only to Ontology objects imported into your Code Repository for access.*

FUNCTIONS API

```
import {X} from "@foundry/functions-api";
```

Based on what you wish to import, 'X' in the above code snippet may be:	
Function	A code-based logic that takes input parameters and returns an output, integrated with the Ontology to interact with objects/object sets and used across dashboards and apps.
OntologyEditFunction	A function that creates, modifies, or deletes Ontology objects. Decorated with @OntologyEditFunction() and have an explicit void return type.
Integer	A data type representing whole numbers without a fractional component, used in various functions and data models.
Long	A data type representing a 64-bit integer, used for larger whole numbers exceeding the range of standard integers.
Float	A data type representing a single-precision 32-bit floating point number, used for decimal values requiring less precision.
Double	A data type representing a double-precision 64-bit floating point number, used for decimal values requiring more precision.
LocalDate	A data type representing a date without a time-zone in the ISO-8601 calendar system, used for date-related properties and functions.
Timestamp	A data type representing a point in time, typically including both date and time components, used for time-related properties and functions.
User	An entity representing an individual with access to the platform, often used in functions and permissions configurations.

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IMPORT

FUNCTIONS API (CONTINUED…)

```
import {X} from "@foundry/functions-api";
```

Based on what you wish to import, 'X' in the above code snippet may be:	
TwoDimensionalAggregation	A data structure used to aggregate data across two dimensions, often used in analytical contexts.
ThreeDimensionalAggregation	A data structure used to aggregate data across three dimensions, providing more complex analytical capabilities.
Attachment	A data type representing a single file or document that can be associated with an object, used for storing and retrieving files.
Attachments	A collection of Attachment objects allowing for multiple files or documents to be associated with an object.
MediaItem	A data type representing a piece of media, such as an image or video, used for storing and displaying media content.
Notification	A mechanism for alerting users about events or changes, often used in workflows and operational contexts.
BasicEmailNotificationContent	A data structure used to define the content of a basic email notification, including subject and body text.
BasicShortNotification	A data structure used to define the content of a short notification, typically for quick alerts or messages.
Filters	A functions API export used to combine multiple filters using and, or, and not.
UserFacingError	A type of error designed to be displayed to end-users, providing clear and actionable error messages.

APPLY DECORATORS

Decorators are functions applied to a declaration using the @ symbol, which allow you to modify or add functionality to classes, methods, properties, or parameters.

@OntologyEditFunction(): A type of function allowing you to create, modify, or delete objects within the Ontology.

@Function(): Code-based logic that takes input parameters and returns an output. Functions are natively integrated with the Ontology, meaning they take in objects/object sets and read property values for use across action types.

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FILTER

Filters return an array or Object list that match the condition(s) provided.

BASIC FILTERS

Filter based on a single property

```
const aggregation = Objects.search().exampleDataAircraft()
                .filter(aircraft => aircraft.arrivalCity.exactMatch('NYC'))
```

ADVANCED FILTERS

Filter based on multiple properties, using "Or" /"And" statements to achieve a more robust filter

```
const filteredFlights = Objects.search()
            .flights()
            .filter(flight => Filters.or(
                Filters.and(flight.destination.exactMatch("SFO"),
flight.passengerCount.gt(100)),
                Filters.and(flight.destination.exactMatch("LAX"),
flight.passengerCount.gt(300))
            ));
```

FILTER OPTIONS

The following filter options can be used based on your needs:

Matching Filter
exactMatch()

**Supported by all types*

Combining Filters
- Filters.or()
- Filters.and()
- Filters.not()

**Filters must be imported from @foundry/functions-api*
**Multiple filters are separated by a comma within the ()*

Array Filter
contains()

String Filters
- phrase()
- phrasePrefix()
- prefixOnLastToken()
- matchAnyToken()
- fuzzyMatchAnyToken()
- matchAllTokens()
- fuzzMatchAllTokens()

Geohash Filters
- withinDistanceOf()
- withinPolygon()
- withinBoundingBox()

Numbers, Dates, and Timestamp Filters
range()
- lt() – Less than
- lte() – Less than or equal to
- gt() – Greater than
- gte() – Greater than or equal to

Linking Filter
.isPresent()

**Checks if there is an active link*

GeoShape Filters
- withinBoundingBox()
- intersectsBoundingBox()
- doesNotIntersectBoundingBox()
- withinPolygon()
- insersectsPolygon()
- doesNotIntersectPolygon()

Boolean Filters
- isTrue()
- isFalse()

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APPLY OPERATIONS

Operations are fundamental code building blocks used to manipulate variables, perform calculations, and compare values.

STRING OPERATIONS

- **charAt(index):** Returns the character at the specified index.
- **charCodeAt(index):** Returns the Unicode of the character at the specified index.
- **concat(...strings):** Combines the text of two or more strings and returns a new string.
- **endsWith(searchString, length?):** Determines whether a string ends with the characters of a specified string.
- **includes(searchString, position?):** Determines whether one string may be found within another string.
- **indexOf(searchValue, fromIndex?):** Returns the index within the calling string object of the first occurrence of the specified value.
- **lastIndexOf(searchValue, fromIndex?):** Returns the index within the calling string object of the last occurrence of the specified value.
- **match(regexp):** Retrieves the matches when matching a string against a regular expression.
- **matchAll(regexp):** Returns an iterator of all results matching a string against a regular expression, including capturing groups.
- **replace(searchValue, replaceValue):** Returns a new string with some or all matches of a pattern replaced by a replacement.
- **replaceAll(searchValue, replaceValue):** Returns a new string with all matches of a pattern replaced by a replacement.
- **search(regexp):** Executes a search for a match between a regular expression and this string object.
- **slice(beginIndex, endIndex?):** Extracts a section of a string and returns it as a new string.
- **split(separator, limit?):** Splits a string object into an array of strings by separating the string into substrings.
- **startsWith(searchString, position?):** Determines whether a string begins with the characters of a specified string.
- **substring(indexStart, indexEnd?):** Returns the part of the string between the start and end indexes, or to the end of the string.
- **toLocaleLowerCase(locales?):** The characters within a string are converted to lower case while respecting the current locale.
- **toLocaleUpperCase(locales?):** The characters within a string are converted to upper case while respecting the current locale.
- **toLowerCase():** Returns the calling string value converted to lower case.
- **toString():** Returns a string representing the specified object.
- **toUpperCase():** Returns the calling string value converted to uppercase.
- **trim():** Removes whitespace from both ends of a string.
- **trimEnd():** Removes whitespace from the end of a string.
- **trimStart():** Removes whitespace from the beginning of a string.

MATHEMATICAL OPERATIONS

- **Math.ceil(x):** Returns the smallest integer greater than or equal to a number.
- **Math.cos(x):** Returns the cosine of a number.
- **Math.exp(x):** Returns e raised to the power of a number.
- **Math.floor(x):** Returns the largest integer less than or equal to a number.
- **Math.max(...values):** Returns the largest of zero or more numbers.
- **Math.min(...values):** Returns the smallest of zero or more numbers.
- **Math.pow(base, exponent):** Returns base to the exponent power.
- **Math.random():** Returns a pseudo-random number between 0 and 1.
- **Math.round(x):** Returns the value of a number rounded to the nearest integer.
- **Math.sign(x):** Returns the sign of a number, indicating whether it is positive, negative, or zero.
- **Math.sqrt(x):** Returns the square root of a number.
- **Math.trunc(x):** Returns the integer part of a number by removing any fractional digits.

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MAPS (DICTIONARIES)

Maps are a data structure allowing you to store key-value pairs, like dictionaries in other programming languages.

- **clear():** Removes all elements from the map object.
- **delete(key):** Removes the specified element from a map object by key.
- **entries():** Returns a new iterator object that contains an array of [key, value] for each element in the map object.
- **forEach(callback, thisArg?):** Executes a provided function once for each key/value pair in the map object.
- **get(key):** Returns the value associated with the specified key, or undefined if the key does not exist.
- **has(key):** Returns a boolean indicating whether an element with the specified key exists in the map object.
- **keys():** Returns a new iterator object that contains the keys for each element in the map object.
- **set(key, value):** Adds or updates an element with a specified key and value to the map object.
- **values():** Returns a new iterator object that contains the values for each element in the map object.
- **size:** Returns the number of elements in a map object.

SET METHODS

Sets are a data structure allowing you to store a collection of distinct elements of the same type.

- **add(value):** Adds a new element with the given value to the set.
- **clear():** Removes all elements from the set.
- **delete(value):** Removes the specified element from the set.
- **entries():** Returns a new Iterator object containing an array of [value, value] for each element in the set.
- **forEach(callback, thisArg?):** Executes a provided function once for each value in the set.
- **has(value):** Returns a boolean indicating whether an element with the specified value exists in the set.
- **keys():** Returns a new iterator object with the values for each element in the set.
- **values():** Returns a new iterator object with the values for each element in the set.

ARRAY/OBJECT SET METHODS

Arrays are a data structure allowing you to store a collection of elements of the same type.

- **Filter:** Creates a new array with all elements that pass the test implemented by the provided function, often used to filter objects based on specific criteria.
- **forEach:** Executes a provided function once for each array element, commonly used to iterate over arrays and perform operations on each element.
- **Includes:** Determines whether an array includes a certain value among its entries, returning true or false as appropriate.
- **Join:** Creates and returns a new string by concatenating all the elements in an array, separated by commas or a specified separator string.
- **Keys:** Returns a new array iterator object that contains the keys for each index in the array.
- **Map:** Creates a new array populated with the results of calling a provided function on every element in the calling array. It can also refer to FunctionsMap for mapping keys to values.
- **Pop:** Removes the last element from an array and returns that element. This method changes the length of the array.
- **Push:** Adds one or more elements to the end of an array and returns the new length of the array.
- **Reduce:** Executes a reducer function (that you provide) on each element of the array, resulting in a single output value.
- **toLocaleString:** Returns a string with a language-sensitive representation of this number. It can be used to format numbers or dates according to locale-specific conventions.
- **Values:** Returns a new array iterator object that contains the values for each index in the array.

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AGGREGATE

Aggregates are functions that combine multiple values into specified summary statistics grouped by common values.

```
public async aircraftAggregationExample():
Promise<TwoDimensionalAggregation<string>> {
        const aggregation = Objects.search().exampleDataAircraft()
                .filter(aircraft => aircraft.arrivalCity.exactMatch('NYC'))
                .groupBy(aircraft => aircraft.departureCity.topValues())
                .count();

        return aggregation;
```

LINK

Links are the relationship between two Object types, which can be 1 to Many or Many to Many

CREATE LINK

```
// 1:1 Link
employee.department.set(department)

// 1:Many/Many:Many Link
employee.projects.add(project)
```

REMOVE LINK

```
// Remove Links
employee.department.clear()
```

LOOP

Loops are a sequence of instructions that repeat until a condition is met.

```
// A For Loop that sets every promotionFlag property to 'Yes'
employees.forEach(e => {
            e.promotionFlag = 'Yes')
        })
```

CHECK LOGS

Logs are a record containing information about the system and program's execution, which are helpful for debugging.

```
console.log(n)
```

***Note:** log displays whatever the 'n' variable is*

EDIT OBJECTS

Edit Objects are functions that can be used to edit Ontology Objects through TypeScript.

CREATE NEW OBJECT

```
// Creating new Object with Unique PK ID
    const newEmployee = Objects.create().employee(Uuid.random())
```

DELETE OBJECT

```
// Deleting an existing Object
    let oldEmployee = Objects.search().employee().filter(e =>
e.id.exactMatch('100000')).all()[0];

    oldEmployee.delete()
```

SET PROPERTY VALUE

```
// Declare New Variable with Type String
    let newEmployeeFirst: string = 'Alex'

// Constant Variable using Object Search and Filter
    const employee = Objects.search().employee().filter(e =>
    e.id.exactMatch('100000')).all()[0]

// Set Property Value to new variable
    employee.firstName = newEmployeeFirst
```

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This page differentiates and explains various elements of TypeScript syntax for your reference:

1. Import the Function Decorator and Integer, FunctionsMap types from @foundry/functions-api

2. Import Ontology Objects from @foundry/ontology-api

3. Decorator - can be either @OntologyEditFunction(), used when making edits to an Object/the Ontology, or @Function(), used for anything else

4. Declares whether a function is **Public** (able to be referenced outside the current TypeScript repository) or **Private** (not able to be referenced outside the repository, used if you want specific segments of code to be hidden)

5. Keyword used for **asynchronous** functions, which saves time and computation power for larger functions

6. Function name

7. Input variables - variable name is separated from return type by a colon and multiple variables are separated by a comma

8. Return type - use “Promise<Type>” for async and “void” for @OntologyEditFunctions()

9. Keyword (i.e., const, let, var) which has a special meaning and cannot be used as an identifier (variable names, function names)

10. Iterates the function over all objects in a set, one at a time

11. Get all **linked Objects** from an individual iterator Object

12. If block - a conditional statement that runs the code block if the specified condition is met

13. Else block – a conditional statement that runs the code block only when the if conditional is not met

14. Return value - the output of the function

```
1  import { Integer, FunctionsMap, Function } from "@foundry/functions-api"
2  import { RedRash, RashLinkedLocation, ObjectSet} from "@foundry/ontology-api"

3  @Function()
4  public 5 async 6 mapCounts(7 laws: ObjectSet<RedRash>): 8 Promise<FunctionsMap<string, Integer>> {
9      const map = new FunctionsMap<string, Integer>();
       await case.all().forEach(c => 10
11         c.rashLinkedLocation.all().forEach(
               key => {
                   let id = key.mapboxId!
12                 if (map.has(id)){
                       let count = map.get(id)! + 1
                       map.set(id, count)
                   }
13                 else {
                       map.set(id, 1)
                   }
               }
           )

       })
14     return map;
   }
```

Questions? Please contact your project lead