Creating and Using Custom Exceptions

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Overview

Understanding custom exceptions

- Overview
- When to use
- Implementing

Define a custom calculation exception

Define a custom calculation operation not supported exception

Add additional custom property

Catch custom exceptions

An alternative to custom exceptions

Understanding Custom Exceptions

Overview

Use existing predefined .NET exception types where applicable, e.g.

- InvalidOperationException if property set/method call is not appropriate for current state
- ArgumentException (or derived) for invalid parameters

Wrap inner exception if appropriate

Don't use custom exceptions for normal expected (non exceptional) logic flow

Understanding Custom Exceptions

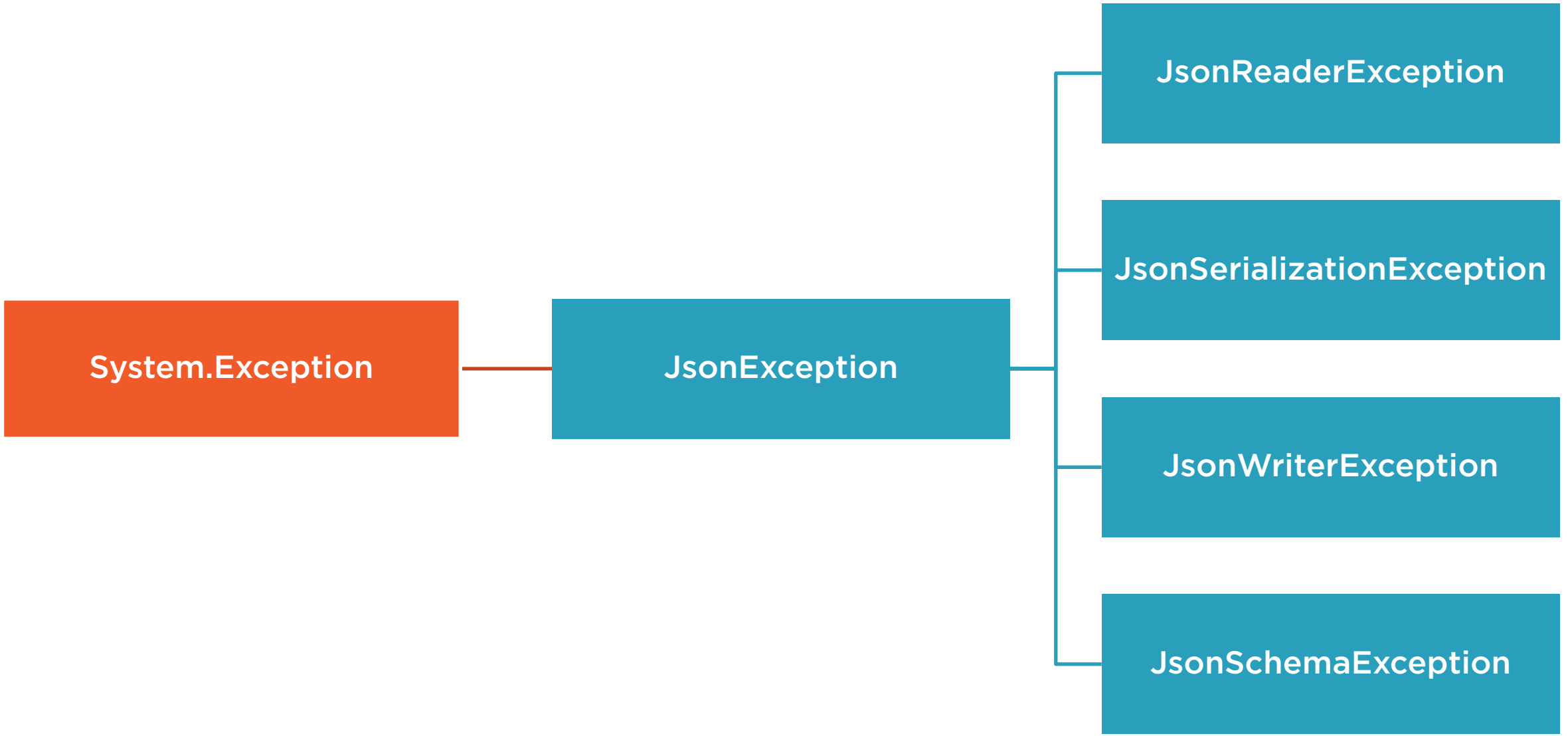
When to use

- Only create custom exception types if they need to be caught and handled differently from existing predefined .NET exceptions
- E.g. want to perform special monitoring of a specific critical exception type
- If building a library/framework for use by other developers so consumers can react specifically to errors in your library
- Interfacing with external API, DLL, service

Understanding Custom Exceptions

Implementing

- Naming convention: ...Exception
- Implement standard 3 constructors
- Add additional properties where needed
- Never inherit from ApplicationException
- Inherit from Exception (or your other custom exception types)
- Keep the number of custom exception types to a minimum



https://www.newtonsoft.com/json/help/html/T_Newtonsoft_Json_JsonException.htm

An Alternative to Custom Exceptions

Data

IDictionary

Key/value pairs

String key (object)

Object value

Arbitrary number of items

- ListDictionaryInternal
- Optimized for smaller number of items
- “This will be smaller and faster than a Hashtable if the number of elements is 10 or less”

Additional/supplementary user-defined exception information

```
public int Calculate(int number1, int number2, string operation)
{
    ...

    if (nonNullOperation == "/")
    {
        ...
    }
    else
    {
        throw new ArgumentOutOfRangeException(nameof(operation),
            "The mathematical operator is not supported.");
    }
}
```

```
else
{
    throw new ArgumentOutOfRangeException(nameof(operation),
        "The mathematical operator is not supported.");
}
```

```
else
{
    var ex = new ArgumentOutOfRangeException(nameof(operation),
        "The mathematical operator is not supported.");

    ex.Data.Add(key: "SUPPLIED_OPERATION", value: operation);

    throw ex;
}
```

```
catch (ArgumentOutOfRangeException ex)
{
    string suppliedOperation = "unknown";

    if (ex.Data.Contains("SUPPLIED_OPERATION"))
    {
        suppliedOperation = (string) ex.Data["SUPPLIED_OPERATION"];
    }

    WriteLine(
        $"Operation '{suppliedOperation}' is not supported. {ex}");
}
```

Data Considerations

Not secure:

- Any catch block can read keys/values
- Any catch block can change keys/values
- Any catch block can delete items
- Any catch block can add new items

Do not store sensitive/confidential data

Application should still operate correctly if data items missing/corrupted

Be careful of key conflicts:

- System.ArgumentException

Summary

Understanding custom exceptions

- Use existing predefined .NET exception types where applicable
- Only create custom exception types if they need to be caught
- ...Exception

CalculationException

CalculationOperationNotSupportedException

public string Operation { get; }

Catch custom exceptions

An alternative to custom exceptions

Up Next:

Writing Automated Tests for Exception Throwing Code