

# FHIR API (%) for .Net programmers

Introduction

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### Who am I?



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- Company: Furore, Amsterdam
- Background:
  - Furore FHIR team
  - > IT trainer & Support
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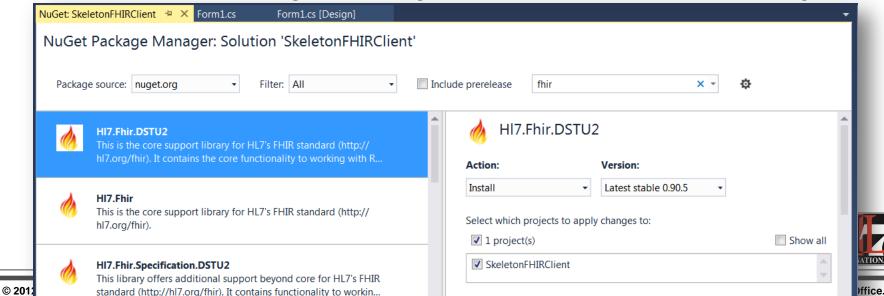
Using the Reference Implementation

### **HL7.FHIR API**

# First step



- Adding the HI7.Fhir package to your solution
  - NuGet Package manager, HI7.Fhir.DSTU2 package



### HI7.Fhir.DSTU2



- Core contents
  - Model classes generated from the spec
  - REST functionality FhirClient
  - Parsers and Serializers
- Source on GitHub:

http://github.com/ewoutkramer/fhir-net-api







### THE MODEL

using H17.Fhir.Model;

### A FHIR Resource



Name	Flags	Card.	Туре	Description & Constraints
Observation  identifier	I	0*	DomainResource  Identifier	Measurements and simple assertions  SHALL only be present if Observation.value[x] is not present  Component code SHALL not be same as observation code  Unique Id for this particular observation
status	?! Σ	11	code	registered   preliminary   final   amended + ObservationStatus (Required)
🏐 category		01	CodeableConcept	Classification of type of observation Observation Category Codes (Example)
🏐 code	Σ	11	CodeableConcept	Type of observation (code / type) LOINC Codes (Example)
<b>௴</b> subject	Σ	01	Reference(Patient   Group   Device   Location)	Who and/or what this is about
🗗 encounter		01	Reference(Encounter)	Healthcare event during which this observation is made
[2] effective[x]	Σ	01		Clinically relevant time/time-period for observation
effectiveDateTime			dateTime	
🏐 effectivePeriod			Period	
issued	Σ	01	instant	Date/Time this was made available
🗗 performer	Σ	0*	Reference(Practitioner	Who is responsible for the observation





```
public partial class Observation : H17.Fhir.Model.DomainResource
  ... status
                          21 Σ 1..1 code
                                                     registered | preliminary | final |
                                                     amended +
                                                     ObservationStatus (Required)
   /// <summary>
   /// Codes providing the status of an observation.
   /// (url: http://hl7.org/fhir/ValueSet/observation-status)
   /// </summary>
   public enum ObservationStatus {Registered, Preliminary, Final, ...}
        var obs = new Observation();
        obs.Status = Observation.ObservationStatus.Preliminary;
```





```
code
                                   CodeableConcept
                                                      Type of observation (code / type)
                                                       LOINC Codes (Example)
public CodeableConcept Code { get; set; }
    obs.Code = new CodeableConcept("http://example.org", "my-example-code");
identifier
                                    Identifier
                                                       Unique Id for this particular
                                                       observation
public ListkIdentifier> Identifier{ get; set; }
    obs.Identifier.Add(new Identifier("http://identifiers.example.org", "12345"));
```

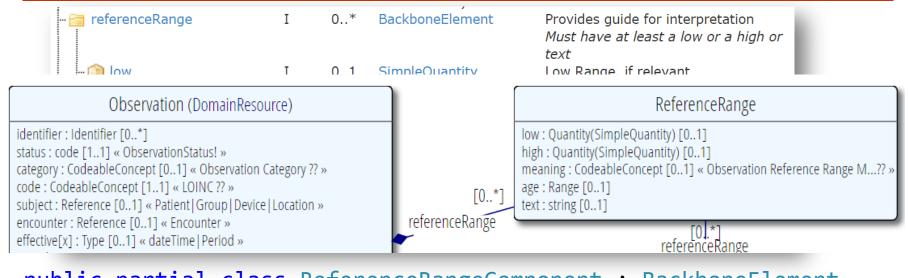


```
public Element Value { get; set;}
```

```
var q = new Quantity();
q.Value = 25;
q.Unit = "sec";
q.System = "http://unitsofmeasure.org";
q.Code = "s";
obs.Value = q;
```







#### public partial class ReferenceRangeComponent : BackboneElement

```
{ ... }
    var refRange = new Observation.ReferenceRangeComponent();
    // fill data for refRange
    obs.ReferenceRange.Add(refRange);
```



# Primitives are not really primitive...



```
Patient (DomainResource)
             identifier: Identifier [0..*]
             active: boolean [0..1]
/// <summary>
/// Whether this patient's record is in active use
/// </summary>
public H17.Fhir.Model.Fhi var pat = new Patient();
                          pat.ActiveElement = new FhirBoolean(true);
public bool? Active { }
                          pat.Active = true;
```





### REST INTERACTIONS

using H17.Fhir.Rest;

# Using the FHIR Client



 See <u>Publicly Available FHIR Servers</u> for available test servers

```
var client = new FhirClient("http://acme.org/fhir");
// client options
client.PreferredFormat = ResourceFormat.Xml;
client.ReturnFullResource = true;
```



# Adding headers to requestor FHIR®

```
client.OnBeforeRequest +=
          (object sender, BeforeRequestEventArgs e) =>
{
        e.RawRequest.Headers.Add("some_key", "some_value");
};

client.OnAfterResponse +=
        (object sender, AfterResponseEventArgs e) =>
{ ... };
```



# C(RUD)





# (C)RUD





# Resource Identity



HI7.Fhir.Rest.ResourceIdentity





#### SEARCH AND BUNDLES

# Making queries



```
var q = new SearchParams()
               .Where("name=Ewout")
               .Include("Patient:organization")
               .LimitTo(10)
               .SummaryOnly()
               .OrderBy("birthdate",
                        H17.Fhir.Rest.SortOrder.Descending);
q.Add("gender", "male");
Bundle result = client.Search<Patient>(q);
```



# Paging through Bundle



```
while (result != null)
  foreach (var e in result.Entry)
    Patient p = (Patient)e.Resource;
    // do something with the resource
  result = client.Continue(result, PageDirection.Next);
```



### Transaction builder









### PARSING/SERIALIZING

using Hl7.Fhir.Serialization;

# Parsing/Serializing



```
// Create a file-based reader for JSON
JsonTextReader reader =
            new JsonTextReader(new StreamReader(@"input.json"));
var parser = new FhirJsonParser();
var new obs = parser.Parse<Observation>(reader);
// Serialize an in-memory observation to a JSON string
var jsonText =
       FhirSerializer.SerializeResourceToJson(new obs);
```





### **WHAT'S NEXT?**

# Support



- Google group: groups.google.com/forum/#!forum/fhir-dotnet
- Support questions: fhirapi@furore.com
- GitHub for issues: github.com/ewoutkramer/fhir-net-api/



# Next Steps for you



- Try the Beginners Track during the hands-on session
- See <a href="https://github.com/furore-fhir/fhirstarters">https://github.com/furore-fhir/fhirstarters</a> for the track

exercises and some .Net examples

 For questions during the track, consult me or use <a href="https://chat.fhir.org/">https://chat.fhir.org/</a>



Go to the FHIR for Advanced .NET developers session





# The End – Questions?

