

Paths	
Nested element	<i>element.subelement.subelement</i>
Array element	<i>array-element</i> [index] ([0] optional)
Choice [x] element	value <i>DataType</i>
Reference choices	<i>reference-element</i> [ <i>Resource or Profile</i> ]
Extensions	extension[ <i>extension-name or id or url</i> ] modifierExtension[ <i>ext-name or id or url</i> ]
Sliced arrays	<i>slice-path</i> [ <i>slice-name</i> ] <i>slice-path</i> [ <i>slice-name</i> ][ <i>reslice-name</i> ]
StructureDefinition escape caret syntax	<i>^structure-definition-path</i> <i>element-path</i> <i>^element-definition-path</i>

Notations and Special Values	
code	#code "optional-display-text"
Coding and CodeableConcept	system#code "optional-display-text" system version#code "optional-display"
Cardinality	min..max (min integer, max integer or *)
UCUM unit	number 'ucum-unit'
Comments	// single line /* multi-line */
Flags	MS (must support) TU (trial use) SU (summary, Σ) N (normative) ?! (modifier) D (draft)
Binding strengths	required, extensible, preferred, example
Multi-line string	""" string or markdown with new line """

Slicing Rubric	
* array-path	^slicing.discriminator.type = #pattern, #value, #type, #profile, #exists
* array-path	^slicing.discriminator.path = FHIRPath string
* array-path	^slicing.rules = #open, #closed, #openAtEnd (optional)
* array-path	^slicing.ordered = true, false (optional)
* array-path	^slicing.description = string (optional)

## More Information






[FSH Spec & Doc](#)
[FSH Chat](#)
[SUSHI Github](#)
[Project Page](#)

Item	Keywords (bold ↔ required)
Alias	<b>Alias:</b> <i>alias-name</i> = url, uri, or urn:oid (alias names can begin with \$)
Profile and Extension	<b>Profile:</b> <i>name</i> or <b>Extension:</b> <i>name</i> <b>Parent:</b> <i>uri</i> <b>Id:</b> <i>id</i> <b>Title:</b> <i>string</i> <b>Description:</b> <i>markdown</i> <b>Mixins:</b> <i>ruleSet1, ruleSet2</i> ...
Instance	<b>Instance:</b> <i>id</i> <b>InstanceOf:</b> <i>profile or resource reference</i> <b>Usage:</b> <i>Example, Definition, Inline</i> <b>Title:</b> <i>string</i> <b>Description:</b> <i>markdown</i> <b>Mixins:</b> <i>ruleSet1, ruleSet2</i> ...
Value Set and Code System	<b>ValueSet:</b> <i>name</i> or <b>CodeSystem:</b> <i>name</i> <b>Id:</b> <i>id</i> <b>Title:</b> <i>string</i> <b>Description:</b> <i>markdown</i>
Invariant	<b>Invariant:</b> <i>id</i> <b>Severity:</b> #error, #warning <b>Description:</b> <i>string</i> <b>Expression:</b> <i>FHIRPath string</i> <b>XPath:</b> <i>XPath expression string</i>
RuleSet	<b>RuleSet:</b> <i>id</i>
Mapping	<b>Mapping:</b> <i>id</i> <b>Source:</b> <i>profile name</i> <b>Target:</b> <i>uri</i> <b>Id:</b> <i>id</i> (for target specification) <b>Title:</b> <i>string</i> (describes target specification) <b>Description:</b> <i>string</i>

SUSHI and IG Publisher	
File extension	.fsh
Install/update SUSHI	\$ npm install -g fsh-sushi
Run SUSHI	\$ sushi <i>input-dir</i> (use . for current dir) \$ sushi <i>input-dir</i> -o <i>output-dir</i>
Update IG Publisher (in output directory)	\$ _updatePublisher (Windows) \$ ./_updatePublisher.sh (Mac)
Run IG Publisher (in output directory)	\$ _genonce (Windows) \$ ./_genonce.sh (Mac)

© 2020 The MITRE Corporation. All rights reserved. Approved for Public Release 19-3439. Distribution Unlimited.  
HL7®, FHIR® and the flame design mark are the registered trademarks of Health Level Seven International.

Rules	
Fixed Value	* <i>path</i> = <i>value</i> * <i>path</i> = <i>value</i> (exactly) (profiles, extensions only) * <i>Quantity-path</i> units = <i>coding</i>
Binding	* <i>path</i> from <i>valueset</i> ( <i>strength</i> ) * <i>Quantity-path</i> units from <i>valueset</i> ( <i>strength</i> )
Cardinality	* <i>path</i> min..max * <i>path</i> min.. (constrain lower bound only) * <i>path</i> ..max (constrain upper bound only)
Data type[x] restriction	* <i>path</i> only <i>type</i> * <i>path</i> only <i>type1</i> or <i>type2</i> or <i>type3</i> ...
Reference restriction	* <i>path</i> only Reference( <i>Resource or Profile</i> ) * <i>path</i> only Reference( <i>Resource1</i>   <i>Profile2</i>   ... )
Flags	* <i>path</i> <i>flag1</i> <i>flag2</i> ... * <i>path1, path2, path3</i> ... <i>flag1</i> <i>flag2</i> ...
Extensions, Standalone	* <i>extension-path</i> contains <i>extension-reference1</i> named <i>local-name1</i> <i>card1</i> <i>flags1</i> and <i>extension-reference2</i> named <i>local-name2</i> <i>card2</i> <i>flags2</i> ... ( <i>extension-reference</i> is a name, id, or url)
Extensions, Inline	* <i>extension-path</i> contains <i>local-name1</i> <i>card1</i> <i>flags1</i> and <i>local-name2</i> <i>card2</i> <i>flags2</i> ...
Slices	* <i>array-element-path</i> contains <i>slice-name1</i> <i>card1</i> <i>flags1</i> and <i>slice-name2</i> <i>card2</i> <i>flags2</i> ...
Invariants	* obeys <i>invariant1, invariant2</i> , ... * <i>path</i> obeys <i>invariant1, invariant2</i> , ...
Mapping	* -> <i>map-string</i> <i>comment-string</i> <i>mime-type</i> * <i>path</i> -> <i>map-string</i> <i>comment-string</i> <i>mime-type</i>

Value Set Rules	
Include single code	* <i>system</i> # <i>code</i> "display"
Exclude single code	* exclude <i>system</i> # <i>code</i> "display"
Include entire code system	* codes from system <i>codesystem</i>
Include from value set	* codes from valueset <i>valueset</i>
Exclude from value set	* exclude codes from valueset <i>valueset</i>
Filter syntax: <i>property operator string-code-boolean-regex</i>	
Filter Operators: (not all apply to every code system) <i>is-a, descendent-of, =, is-not-a, regex, in, not-in, generalizes, exists</i>	
Include codes with filtering	* codes from system <i>codesystem</i> where <i>filter1</i> and <i>filter2</i> and ...
Exclude codes with filtering	* exclude codes from system <i>codesystem</i> where <i>filter</i>

Code System Rules	
Define local code	* <i>code</i> "display text" "definition text"

Paths	
Nested element	stage.assessment
Array element	name[0].given[1]
Choice [x] element	valueQuantity, valueReference
Reference choices	performer[Organization]
Extensions	extension[terminationReason] extension[http://hl7.org/fhir/StructureDefinition/location-distance] (Instance only; otherwise use slice name)
Sliced arrays	component[DiastolicPressure]
Resliced arrays	component[RespiratoryScore][OneMinute]
StructureDefinition escape (caret syntax)	^abstract component[VariationCode] ^short

Notations and Special Values	
code	#confirmed
Coding and CodeableConcept	http://snomed.info/sct#363346000 "Malignant neoplastic disease (disorder)" ICD10CM#C004
Cardinality	0..1 1..1 2..* (two-sided) ..1 1.. 2.. (one-sided)
Comments	// end of line or single line /* This comment continues over multiple lines */

Slicing Rubric	
* component ^slicing.discriminator.type = #pattern	
* component ^slicing.discriminator.path = "code"	
* component ^slicing.rules = #open	
* component ^slicing.ordered = false	
* component ^slicing.description = "Slice on component.code"	

SUSHI and IG Publisher	
FSH file	MyFile.fsh
Install/update SUSHI	\$ npm install -g fsh-sushi
Run SUSHI from FSH directory	\$ sushi .
Update IG Publisher (from ./build directory)	\$ _updatePublisher (Windows) \$ ./_updatePublisher.sh (Mac)
Run IG Publisher (from ./build directory)	\$ _genonce (Windows) \$ ./_genonce.sh (Mac)

Item	Keywords
Alias	Alias: UCUM = http://unitsofmeasure.org Alias: race = urn:oid:2.16.840.1.113883.6.238 Alias: \$GenderIdentity = http://hl7.org/fhir/StructureDefinition/patient-genderIdentity
Profile	Profile: CancerPatient Parent: \$USCorePatient Id: mcode-cancer-patient Title: "Cancer Patient" Description: "A patient diagnosed with cancer"
Instance	Instance: mCODETumorMarkerExample01 InstanceOf: TumorMarker Usage: Example Description: "Epidermal growth factor example."
Extension	Extension: TerminationReason Id: mcode-termination-reason Title: "Termination Reason" Description: "Reason for stopping a treatment."
Value set	ValueSet: AnatomicalOrientationVS Title: "Anatomical Orientation Value Set" Description: "Values for anatomical orientation."
Code system	CodeSystem: AJCC_FairUse Title: "AJCC Fair Use" Description: "A small subset of AJCC staging codes used for IG examples."
Invariant	Invariant: us-core-8 Description: "Patient.name.given or Patient.name.family or both SHALL be present" Expression: "family.exists() or given.exists()" Severity: #error XPath: "f:given or f:family"
RuleSet	RuleSet: USCoreTerminologyRuleSet
Mapping	Mapping: USCorePatientToArgonaut Source: USCorePatient Target: "http://unknown.org/Argonaut-DQ-DSTU2" Id: argonaut-dq-dstu2 Title: "Argonaut DSTU2"

Code System Rule	
Local code definition	* #NED "No Evidence of Disease" "No physical evidence of disease on exam or imaging tests."

Rules	
Fixed Value	* status = #arrived * code = SCT#18165001 "Jaundice (finding)" * onsetDateTime = "2019-04-02" * subject = Reference(EveAnyperson) * valueQuantity = 2.5 'mm' * valueQuantity units = UCUM#mm "millimeters"
Binding	* bodySite from CancerBodyLocationVS (preferred) * valueCodeableConcept from http://loinc.org/vs/LL1971-2 (required) * valueQuantity units from LengthUnitsVS (extensible)
Cardinality	* severity 0..0 * subject 1..
Datatype[x] restriction	* value[x] only CodeableConcept * effective[x] only dateTime or Period
Reference restriction	* subject only Reference(CancerPatient) * asserter only Reference(Practitioner   Patient)
Flags	* deceased[x] MS ?! SU * reasonCode, extension[terminationReason] MS
Extension, Standalone	* extension contains \$GenderIdentity named genderIdentity 0..1 MS and http://hl7.org/fhir/StructureDefinition/patient-disability named disability 0..1 MS
Extension, Inline	* extension contains treatmentIntent 0..1 MS and terminationReason 0..* MS
Slicing	* component contains GeneStudied 0..* MS and VariationCode 0..* and GenomicDNAChange 0..1
Invariants	* obeys us-core-9 * name obeys us-core-8
Mapping	* -> "Patient" * identifier.system -> "Patient.identifier.system"

Value Set Rules	
Single code	* SCT#54102005 "G1 grade (finding)"
Exclude single code	* exclude SCT#12619005
All codes in system	* codes from system HGVS
Filter Rules for SNOMED-CT (assumes code system aliased as 'SCT')	
Subsumption	* codes from system SCT where concept is-a #123037004 "Body Structure"
Exclude subsumptions	* exclude codes from system SCT where concept is-a #128462008 "Secondary malignant neoplastic disease (disorder)"