— CHAPTER 02 · FOUNDATIONS · BEAT 1 — OPEN THE BOX

Every FHIR resource has the same *skeleton*.

By the end of this chapter you will name the six anatomical parts every FHIR resource shares, tell extension apart from modifierExtension — and know why one of those can break clinical safety — and never again confuse id with identifier.

Learning goals

- Six anatomical parts
- extension vs modifierExtension
- id vs identifier

— CONCEPT · ANATOMY

Six anatomical parts — then the clinical content.

Every FHIR R4 resource — Patient, Observation, Encounter, all hundred and fifty of them — opens with the same six fields. Memorize these and you can read any FHIR resource on first sight.

1 · IDENTITY

resourceType

The type tag. Patient, Observation, Encounter — tells every parser what shape to expect.

2 · IDENTITY

id

Server-assigned logical key. Opaque. Lives in the URL: /Patient/abc-123.

3 · PROVENANCE

meta

versionId, lastUpdated, profile, security, tag — metadata about the resource itself.

4 · HUMAN

text

XHTML narrative. The human-readable safety net every clinician trusts.

5 · EXTENSIBILITY

extension

Adds locale, specialty, payer fields the core spec deliberately omits.

6 · MUST-UNDERSTAND

modifierExtension

Same shape — but CHANGES meaning. Ignore one you do not understand and you misread the resource.

THEN · DOMAIN

name, gender, birthDate …

The actual clinical content. Different per resource type. Patient has name; Observation has value.

MENTAL MODEL

Skeleton + organs

Six bones are universal. Organs are domain-specific. Same skeleton; different organs.

— CONCEPT · NARRATIVE · TEXT

Every resource carries a clinician-readable paragraph.

The text element is a chunk of XHTML — wrapped in — that renders the resource as prose a doctor can scan. If the structured data and the narrative disagree, that is a patient-safety incident.

— PATIENT.TEXT · EXCERPT

```
"text": {
  "status": "generated",
  "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\"><p><b>Peter James Chalmers</b>, male, born 1974-12-25, MRN 12345.</p></div>"
}
```

Servers render the div; clients display it verbatim. Always render the narrative — clinicians trust it before they trust your structured fields.

text.status — four values

- generated — derived from structured data
- extensions — includes extension data
- additional — info NOT in structured
- empty — no narrative

— CONCEPT · CONTAINED · THE EXCEPTION

Inline a whole resource — only when it has no independent life.

contained[] holds resources that have no independent existence on the server. No URL of their own. Referenced locally with a #fragment. The rule of thumb — almost never use it.

— CAN-BE · INLINE VIA CONTAINED

One-off context · no independent existence

A visiting consultant Practitioner attached to a single Observation. Not in your directory. Will never be referenced again.

```
"contained": [{ "resourceType": "Practitioner", "id": "prac1", "name": [...] }],
"performer": [{ "reference": "#prac1" }]
```

— SHOULD-BE · USE A REFERENCE

Anything with a chance of independent existence

Real Practitioners, Organizations, Locations — make them first-class server resources and reference by URL.

```
"performer": [{ "reference": "Practitioner/abc-123" }]
```

- contained can't be searched
- contained can't be referenced elsewhere
- Reference — deep dive in Ch 3

— CONCEPT · EXTENSION · THE ESCAPE HATCH

Core stays minimal. Everything country-specific lives in extensions.

FHIR core resources cover what the whole world agrees on. Everything country-specific, specialty-specific, payer-specific goes here. Each extension has two parts — a url that is the contract, and a value[x] that is the data.

— PATIENT.EXTENSION · US CORE RACE

```
"extension": [{
  "url": "http://hl7.org/fhir/us-core/StructureDefinition/us-core-race",
  "extension": [{
    "url": "ombCategory",
    "valueCoding": {
      "system": "urn:oid:2.16.840.1.113883.6.238",
      "code": "2106-3",
      "display": "White"
    }
  }]
}]
```

That is how a US Patient declares race — without the core Patient spec needing a race field. The OMB category code is the canonical US race vocabulary.

— CONCEPT · MODIFIEREXTENSION · THE DANGEROUS COUSIN

Some extensions don't add — they *change meaning*.

MUST

REJECT IF YOU DON'T UNDERSTAND IT

A processor that encounters a modifierExtension it does not recognize MUST reject the resource. Not warn. Reject.

1

RULE THAT SEPARATES SAFE FROM UNSAFE

This is the single hardest rule in FHIR — and the line between a safe client and a clinical-safety bug.

mg/dL

EXAMPLE · ISO21090-PQ-TRANSLATION

A Quantity carries a translated unit. Ignore the modifierExtension and you ship the wrong unit downstream.

Ava

Marcus · production scar

— CONCEPT · META · FOUR FACETS

Where did this come from, what does it claim to be, who can see it, how do I find it?

meta is the resource's metadata about itself. Four facets — provenance, conformance, security, indexing. Every FHIR server populates these, every client should read them.

• PROVENANCE

versionId · lastUpdated · source

versionId increments on every write. lastUpdated is the server timestamp. source says where the data originated.

• CONFORMANCE

profile[]

Array of profile URLs this resource claims to conform to — US Core Patient, IPS Patient, your custom profile.

• SECURITY

security[]

Security labels — confidentiality, sensitivity, break-the-glass markers that gate access decisions.

• INDEXING

tag[]

Free-form labels you use for workflow, filtering, batch operations. Server-side or client-side conventions.

```
"meta.versionId": "3"
"meta.profile": ["http://hl7.org/fhir/us-core/StructureDefinition/us-core-patient"]
"meta.security": [{ "code": "R" }]
"meta.tag": [{ "code": "needs-review" }]
```

— CONCEPT · THE ROOKIE TRAP

id is for the database. identifier is for the real world.

They sound the same. They are not the same. id is singular, lower-case, server-assigned, opaque. identifier is a plural array of business identifiers — MRN, SSN, NPI — each with system, value, use, period.

— ID · SERVER LOGICAL KEY

"id": "abc-123"

Singular. Lower-case. Server-assigned. Opaque. Appears in the URL path — /Patient/abc-123. Has no meaning outside that one server.

- One per resource
- Lives in the URL

— IDENTIFIER · BUSINESS KEYS

```
"identifier": [{
  "system":
"http://hospital.example.org/mrn",
  "value": "MRN-44721",
  "use": "official",
  "period": { "start": "2018-03-01" }
}]
```

Plural array. Each entry has a system (namespace), value, use (official · usual · temp · old), and optional period of validity.

- MRN
- SSN
- NPI

Logical key vs business keys — every rookie confuses them once. Read this slide twice.

— WALKTHROUGH · HAPI.FHIR.ORG/BASER4/PATIENT/EXAMPLE

Six anatomical parts, then the clinical content — in one real document.

— PATIENT/EXAMPLE · TRIMMED

```
{
  "resourceType": "Patient",                                  // 1
  "id": "example",                                            // 2
  "meta": {
    "versionId": "1",
    "lastUpdated": "2024-09-12T08:14:22Z",
    "profile": ["http://hl7.org/fhir/us-core/StructureDefinition/us-core-patient"]
  },                                                          // 3
  "text": {
    "status": "generated",
    "div": "<div xmlns=\"http://www.w3.org/1999/xhtml\">Peter Chalmers, male,
b.1974</div>"
  },                                                          // 4
  "extension": [{ "url": "...us-core-race", "extension": [...] }],   // 5
  // no modifierExtension on this Patient — but the slot is always there   // 6
  "identifier": [{ "system": "urn:oid:1.2.36.146.595...", "value": "12345", "use": "usual" }],
  "name": [{ "family": "Chalmers", "given": ["Peter", "James"] }],
  "gender": "male",
```

— TRY IT YOURSELF · 60 SECONDS

Slice the anatomy out of a real Patient.

Hit the public HAPI sandbox, pull Patient/example, and project just the anatomical parts — id, identifier, meta, narrative status, and how many extensions and modifierExtensions the resource carries.

— RUN THIS IN YOUR TERMINAL

curl https://hapi.fhir.org/baseR4/Patient/example | jq '{id, identifier, meta, narrative_status: .text.status, extension_count: (.extension // [] | length), modifier_extension_count: (.modifierExtension // [] | length)}'

You will see the logical id, the business identifiers, the meta block, the narrative status, and counts of both extension flavors. Then go hunt — find a Patient on the sandbox that has a modifierExtension and tell yourself in one sentence what semantic it flips.

— NEXT CHAPTER

Chapter 03 — Datatypes & References: CodeableConcept, Reference, Quantity, Period, Identifier. The building blocks inside the building blocks.

- hapi.fhir.org · public R4 sandbox
- Hunt a modifierExtension in the wild
- Next · Ch 3 · Datatypes & References