# Introduction to Object Identifiers (OIDs) and Registration Authorities

# Many approaches to object identification

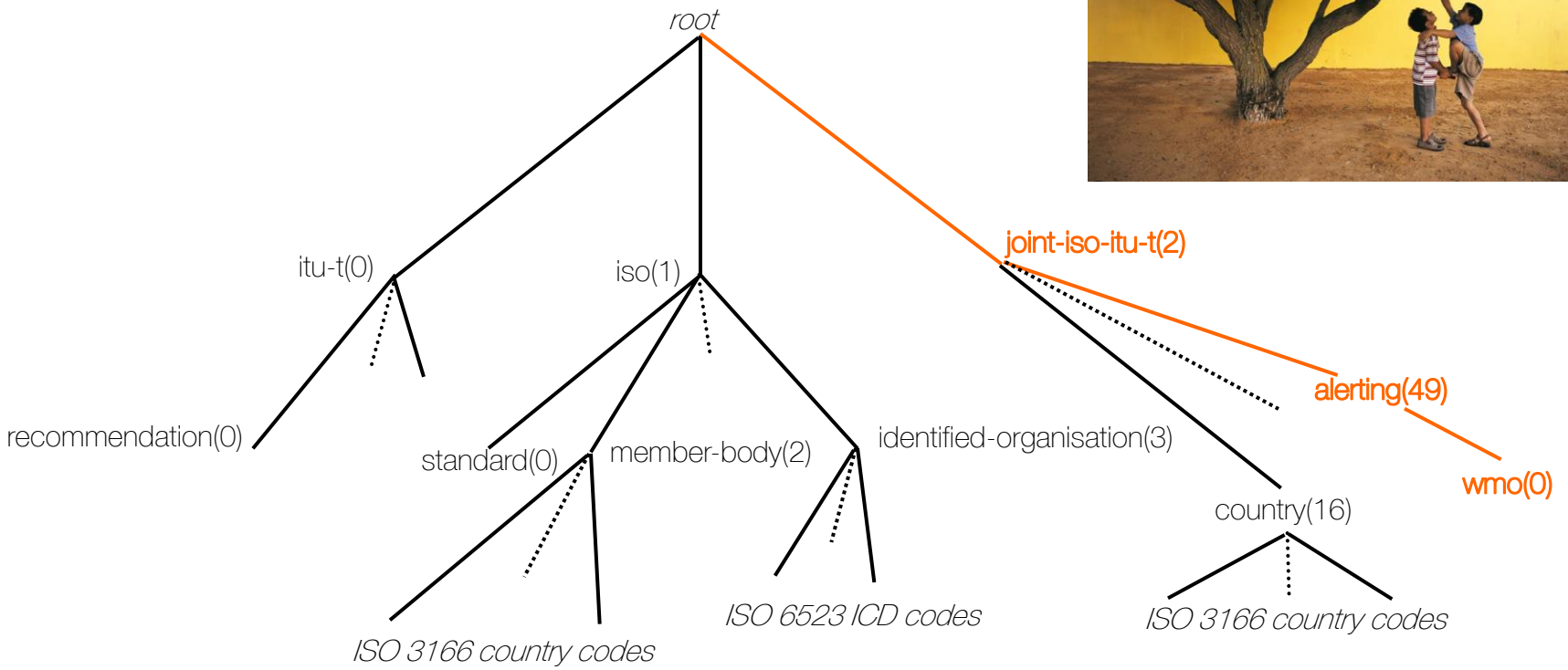
- Bar codes
- EPCs
- IP addresses
- OIDs
- URLs
- URNs
- UUIDs
- etc.

- Some are character-based, some are binary
- Some need central allocation, others have various levels of hierarchy
- Some are fixed length, others are variable length

# Basic concepts of Object Identifiers (OIDs)

- One of many identification schemes
- Basically very simple: A tree
- Arcs are numbered and may have an associated alphanumeric identifier (beginning with a lowercase)
- Infinitely many arcs from each node (except at the root)
- Objects are identified by the path (OID) from the root to a node
- A Registration Authority (RA) allocates arcs beneath its node to subordinate RAs, and so on, to an infinite depth
- The OID tree is a hierarchical structure of RAs
- Standardized in the Rec. ITU-T X.660 | ISO/IEC 9834 series (ITU-T SG17 and ISO/IEC JTC 1/SC 6)
- Originated in 1985, still in use!

# Top of the OID tree




Example: `{joint-iso-itu-t(2) alerting(49) wmo(0)}`

Note: The name of the 3 top-level arcs does not imply a hierarchical dependency to ISO or ITU-T.

# What is an "object"?

- "*Anything in some world, generally the world of telecommunications and information processing or some part thereof, which is identifiable and may be registered*" [Rec. ITU-T X.660 | ISO/IEC 9834-1]
- OIDs can uniquely and universally identify:
  - standards (ITU-T Recommendations, ISO International Standards, etc.)
  - countries, companies, projects
  - encryption algorithms
  - ASN.1 modules, ASN.1 types
  - X.500/LDAP attributes
  - Rec. ITU-T X.509 certificates (OIDs are widely deployed in e-commerce)
  - certification policies
  - SNMP MIBs
  - ID schemes (incl. RFID, 2D bar codes, etc.)
  - HL7 patient medical information
  - alerts and alerting agencies
  - etc.
- More information at http://www.oid-info.com/faq.htm

# Some advantages

- Human-readable notation:

```
{joint-iso-itu-t(2) alerting(49) wmo(0) authority(0)}
```

- Dot notation:

```
2.49.0.0
```

- URN notation:

```
urn:oid:2.49.0.0
```

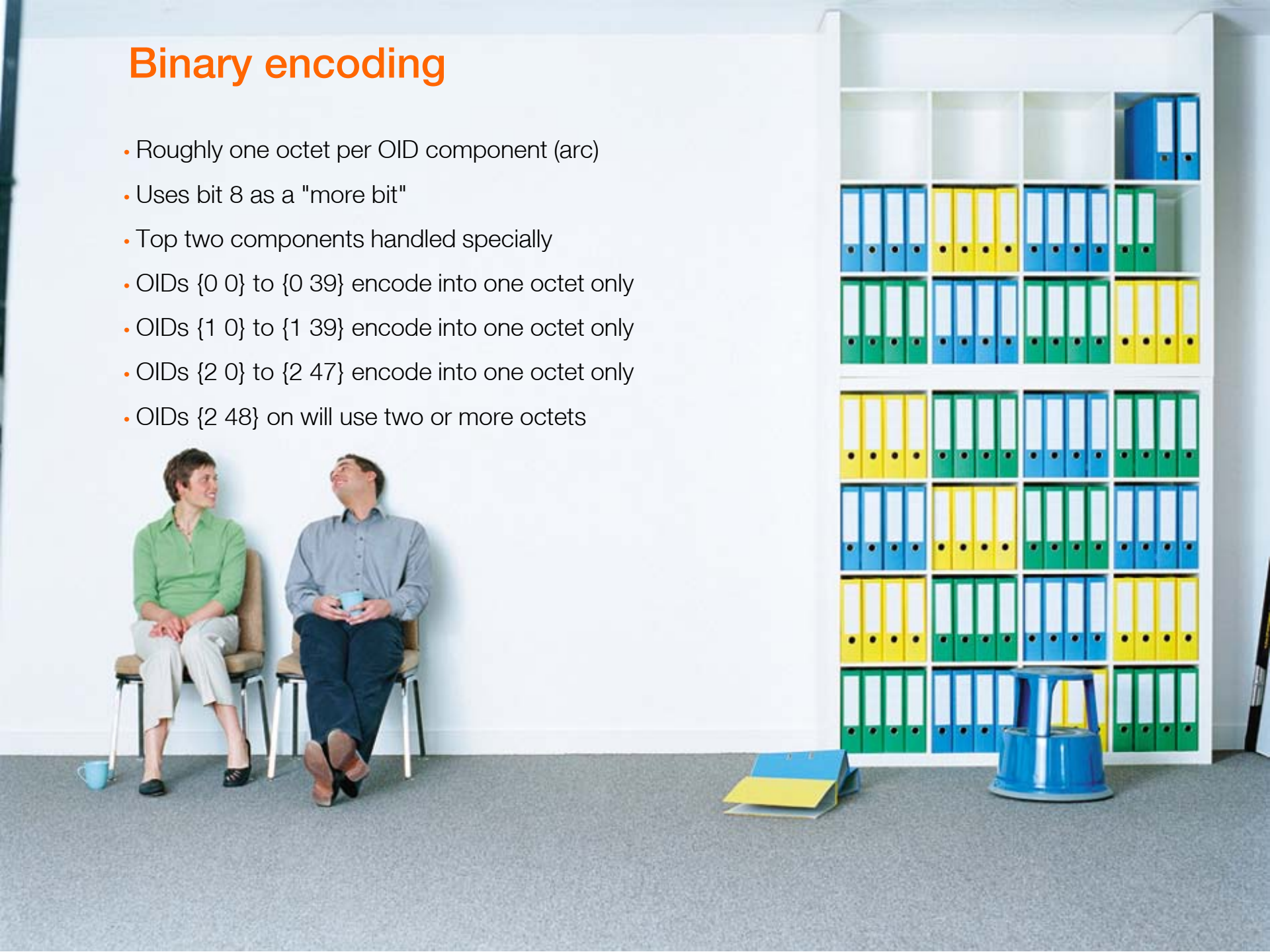
- Internationalized notation (OID-IRI):

```
/Alerting/WMO/0
```

  - Unicode labels (ISO/IEC 10646) can be associated to each OID arc
- Used in a lot of ISO standards, ITU-T Recommendations and IETF RFCs, but not only!
- Very good take up: 909,000+ OIDs described at http://oid-info.com; many more exist
- Compact binary encoding (normally used in all computer communications)
- Allows transmission over constrained networks
- Can also be used in XML documents

# Binary encoding

- Roughly one octet per OID component (arc)
- Uses bit 8 as a "more bit"
- Top two components handled specially
- OIDs {0 0} to {0 39} encode into one octet only
- OIDs {1 0} to {1 39} encode into one octet only
- OIDs {2 0} to {2 47} encode into one octet only
- OIDs {2 48} on will use two or more octets



# Web-based OID repository

- Provide details about an OID (description, rules to allocate child OIDs, contact information about the Registration Authority…)
- Not an official Registration Authority ➔ each OID has to be officially allocated by the parent RA before being described in the OID repository
- Descriptions are entered "à la wiki" by any user but are validated by the OID repository administrator
- Automatic notification by email to the RA (if known) when child OIDs are added
- Many other services: search, update of OID descriptions, tree display, registrant accounts
- Web site sponsored by Orange: http://oid-info.com

OID Repository

http://www.oid-info.com

Home | Tree display | Search OID | FAQ

Display OID: Go

joint-iso-itu-t(2) › alerting(49)

wmo ( 0 )

child OIDs: authority(0) · country-msg(1) · org(2) · org-msg(3) ·

Format of this page
Modify this OID
Create a child OID
Create a brother OID

## OID description

| | | |
|---|---|---|
| OID: | {joint-iso-itu-t(2) alerting(49) wmo(0)} | (ASN.1 notation) |
| | 2.49.0 | (dot notation) |
| | /Alerting/WMO | (OID-IRI notation) |

Description: World Meteorological Organization (WMO)

Information: In applications and services which support alerting, it is necessary to identify various information objects. Subsequent OIDs identify content included in alert messages or otherwise associated with the activity of alerting.

The procedures (and criteria for acceptance) for allocating subsequent arcs are described in WMO/TD No. 1556 "Administrative procedure for registering WMO alerting identifiers."

WMO maintains a publicly accessible Register of Alerting Authorities. In collaboration with the WMO Public Weather Services Programme, entries in the WMO Register of Alerting Authorities shall be maintained by the editors designated by the Permanent Representatives (PRs) to the WMO of national WMO Members.

## Current Registration Authority

Name: Ms. Haleh Kootval — This person requested privacy protection.

# Procedures for the operation of a Registration Authority

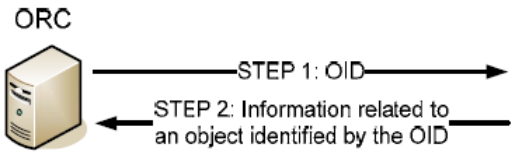
- Rec. ITU-T X.660 | ISO/IEC 9834-1: Main text which defines general procedures for the operation of an RA and applies to any RA ("the Constitution")
- Other standards in the series define procedures for allocation under a specific (high-level) OID arc:
  - Rec. ITU-T X.662 | ISO/IEC 9834-3: rules for allocation of arcs underneath top-level arc `joint-iso-itu-t(2)`
  - Rec. ITU-T X.666 | ISO/IEC 9834-7: Registration of international organizations under {joint-iso-itu-t(2) international-organizations(23)}
  - Rec. ITU-T X.667 | ISO/IEC 9834-8: Registration of UUIDs
  - Rec. ITU-T X.668 | ISO/IEC 9834-9: Registration of ID schemes for applications and services using tag-based identification

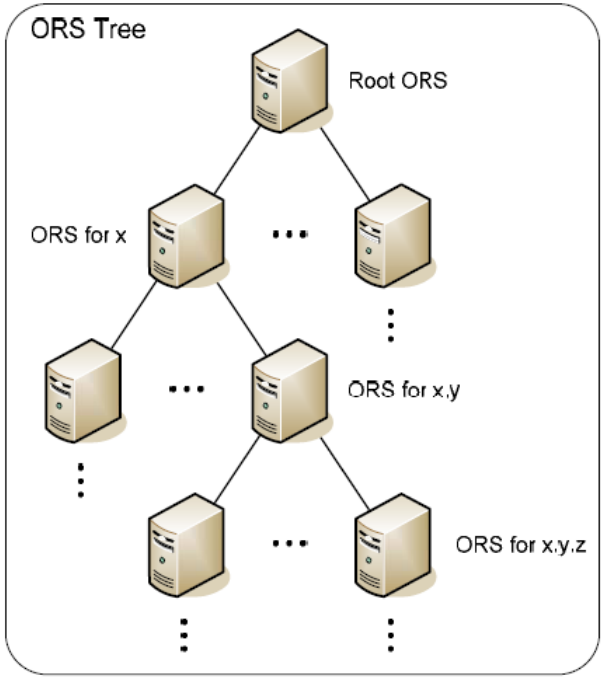
# Arcs at the 1st and 2nd levels of the OID tree

- Excerpt from the OID repository at http://www.oid-info.com

# OID resolution system (ORS)

- A DNS-based protocol to provide information associated with any OID:
  - description, registration authority, creation date, etc.
  - child OIDs
  - OID-IRI canonical form
- Rec. ITU-T X.672 | ISO/IEC 29168-1 (2011)




# Use of OIDs in the context of the Internet of Things

- Rec. ITU-T X.668 | ISO/IEC 9834-9 (2008) is a way to unify the many identification schemes used for the Internet of Things (RFID, bar codes, ISBN, etc.)
- ID schemes are registered under the arc
  `{joint-iso-itu-t(2) tag-based(27)}`
- Does not cause existing tags to become obsolete
- Use case example: a tag placed on a billboard poster can be read with a mobile phone and make it easy for the user to get additional multimedia (text, graphics, even voice or video) information about the content of the poster
- Other use cases in Rec. ITU-T F.771

# Use of OIDs for alerts

- Use of OIDs to identify alerting agencies and alert messages for early warning of populations
- Standardized in Rec. ITU-T X.674 (2011)
- Potentially all kind of alerts: weather, cybersecurity, food…
- Sub-arc `{joint-iso-itu-t(2) alerting(49) wmo(0)}` allocated to the World Meteorological Organization (WMO) for weather alerts and weather alerting agencies
  - Used with the Common Alerting Protocol (OASIS CAP, Rec. ITU-T X.1303)

# More information on OIDs

- Free standards:
  http://www.itu.int/rec/T-REC-X/en
  (Rec. ITU-T X.660 & X.670 series)

- OID repository:
  http://oid-info.com

- Other presentations:
  - http://oid-info.com/faq.htm#3
  - ITU-T OID handbook

- Frequently Asked Questions:
  http://oid-info.com/faq.htm