

Intelligent E-learning System

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Outline

- Definitions
- Objectives
- Motivations
- Next-generation E-learning
- Framework, standards and technologies
- Conclusion

E-learning

“The convergence of the **Internet** and **learning**, or Internet-enabled learning.”

“The use of **network** technologies to create, foster, deliver, and facilitate **learning, anytime** and **anywhere**.”

“The effective learning process created by **combining digitally delivered content with** (learning) **support** and services.”

E-learning = Network + Asynchronous + Support/services

E-learning system

- Learning Management System (LMS) “*provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance*”
- Content Management System (CMS) is “*the organizing, categorizing, and structuring of information resources (text, images, documents etc.) so that they can be stored, published, and edited with ease and flexibility*”
 - Learning Content Management System (LCMS)

Objectives

- To prepare for next-generation E-learning
- To provide some framework for LCMS of next-generation E-learning
- To introduce some relevant standards and technologies

Motivations

- Students' needs
 - Availability: content quantity & quality
 - Accessibility: access device & connectivity
 - Mobility: access anytime, anywhere
- Teachers' needs
 - Interoperability: system independent
 - Reusability: shared learning objects

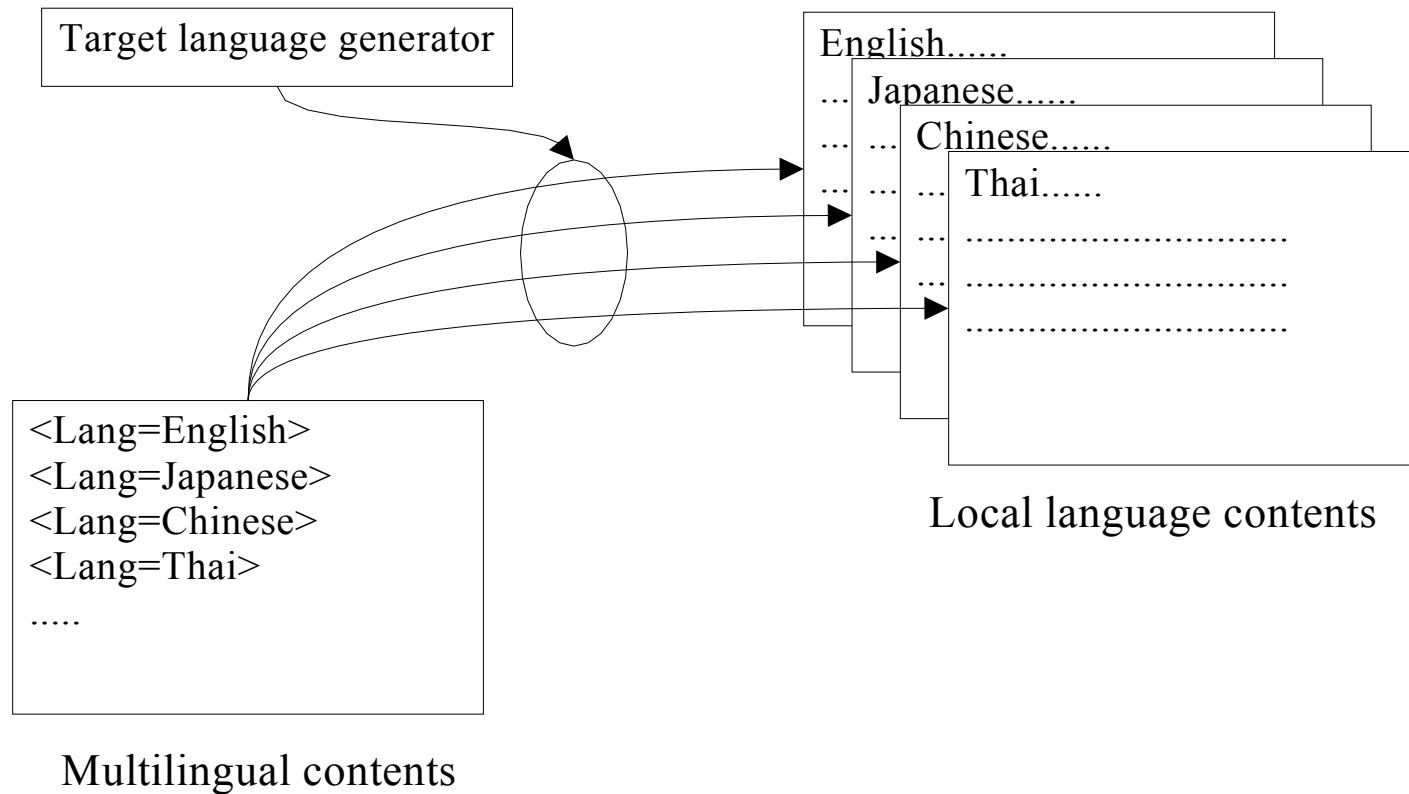
Next-generation E-learning

- Multilingual Contents
 - Availability
- Ubiquitous Access
 - Accessibility, Mobility
- Shared and Reusable Contents
 - Interoperability, Reusability

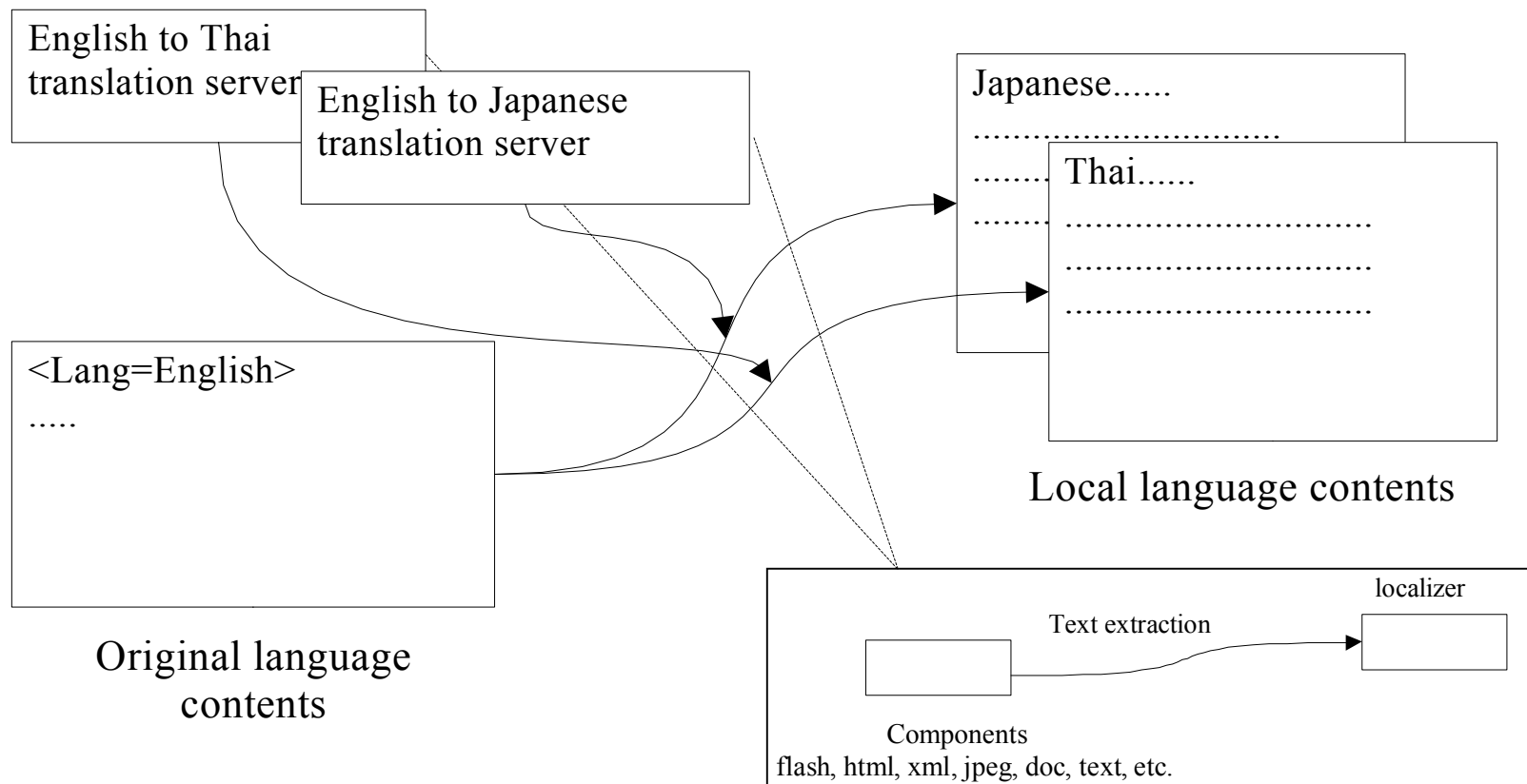
Multilingual E-learning

- 3 models for multilingual learning objects
 - Multilingual contents
 - Contents are pre-translated in multiple languages and stored in the same learning object
 - Client application chooses target language to be displayed
 - Online machine translation contents
 - Contents are stored in original form
 - Texts are extracted from learning objects
 - Utilizes target language translation servers
 - Intermediate representation contents
 - Contents are converted to semantic form
 - Translation of semantics to target language is required

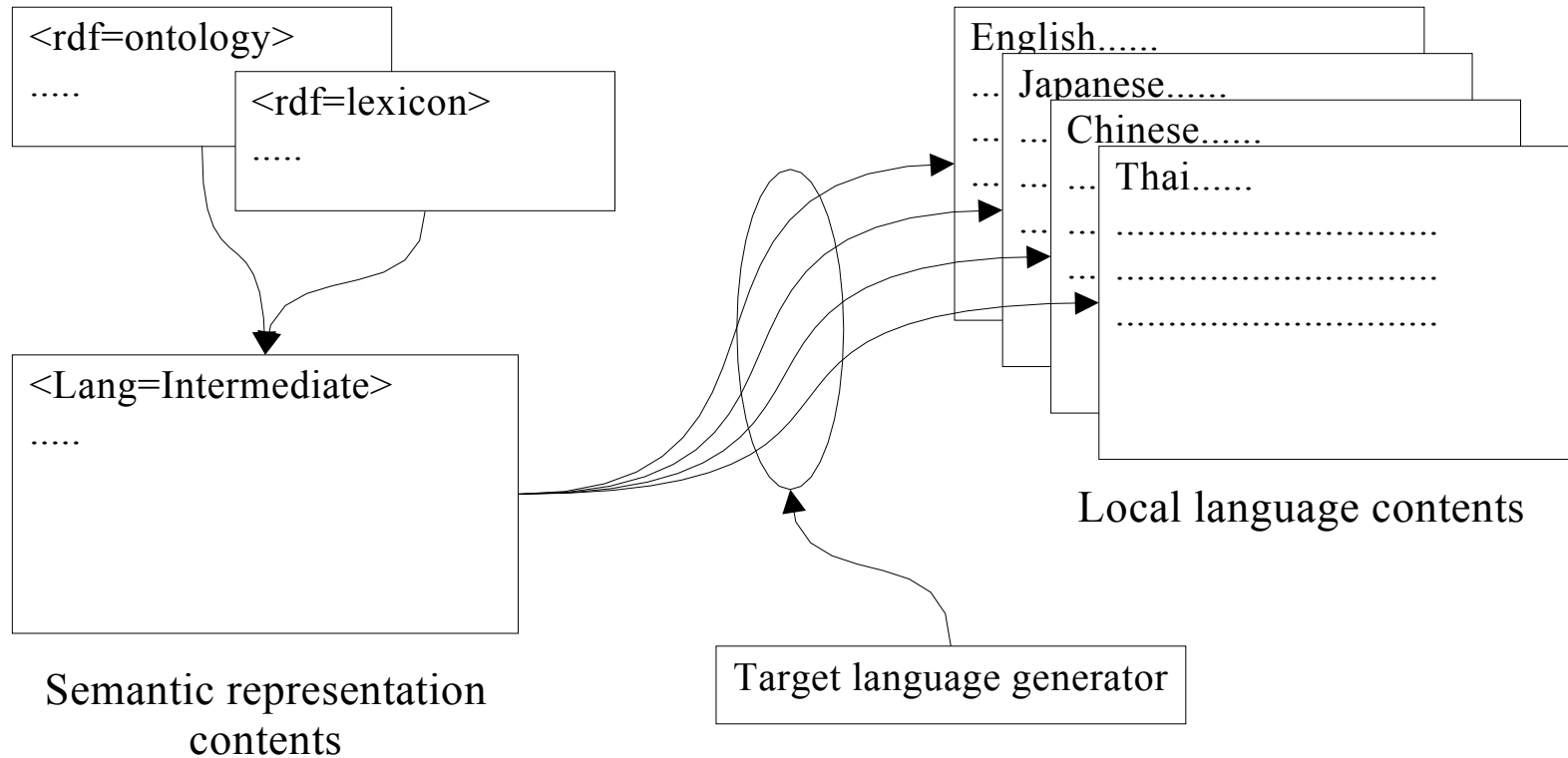
Multilingual contents



Online machine translation contents

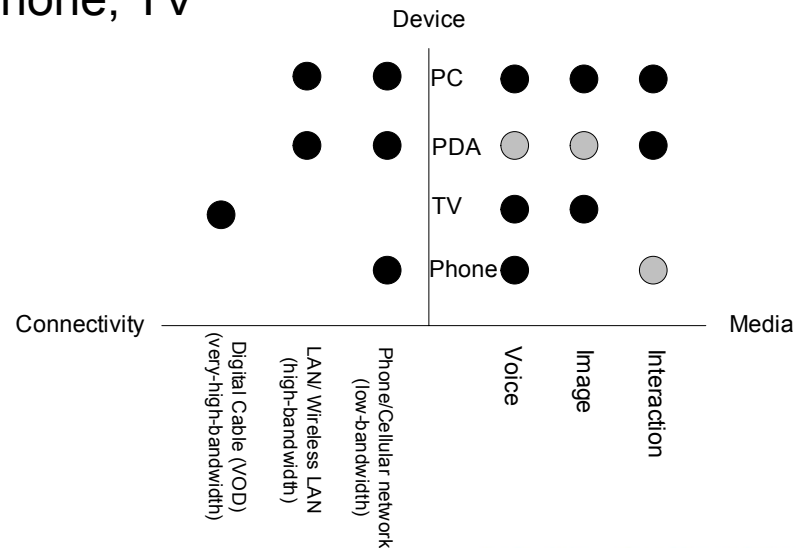


Intermediate representation contents



Ubiquitous E-learning

- E-learning anytime, anywhere
- Providing contents access for users with different access parameters
 - Device
 - PC, PDA, Telephone, Mobile phone, TV
 - Connectivity
 - Connection types, Bandwidth
 - Mobility
 - Roaming, Device switching



Ubiquitous E-learning (2)

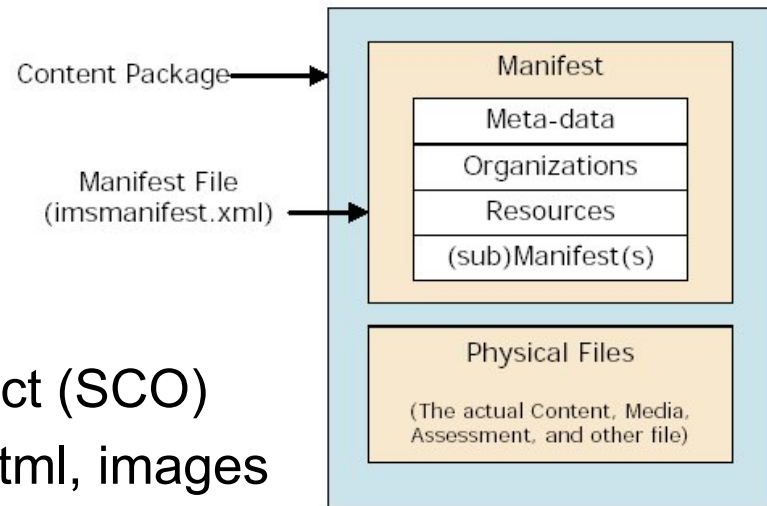
- Design challenges
 - Content-adaptive LCMS
 - Media adaptive
 - Text, Image, Audio, Video, Interactivity
 - Presentation adaptive
 - Visual quality, Audio quality, Interaction type/level
 - Enable continuous access to the contents even when access condition is changed

Ubiquitous E-learning (3)

- 3 models for content-adaptive LCMS
 - Static
 - Media archive – multiple versions of the same contents are created, e.g. HTML files for high/low bandwidth, PC/PDA, video/audio files with variable bit rates
 - Dynamic
 - Online media transformation: speech <->text <-> image
 - Online bandwidth-adaptive video/audio streaming
 - Intermediate
 - Separation of presentation from content structure – e.g. use of Style sheet with XML document
 - Use of semantic descriptions for media generation

Shared reusable learning objects

- E-learning content standard
 - Reducing cost and efforts in development
 - SCORM (Sharable Content Object Reference Model)
 - Interoperability
 - Metadata standards
 - Reusability
 - Sharable Content Object (SCO)
 - Learning assets, e.g. html, images



Shared reusable learning objects (2)

- E-learning resource sharing
 - Web pages
 - Web services
 - Peer-to-peer resource sharing
 - Learning object repository
- E-learning resource discovery
 - Full-text search engine
 - Search based on text contents of resources
 - Metadata search engine
 - Search based on SCORM metadata elements
 - Semantic (ontology-based) search engine
 - Explore semantic relations in resource contents

Standards and technologies

- Machine translation
- Media transformation
 - Image/Speech/Text
 - Bandwidth-adaptive video/audio
- Metadata standards
 - SCORM
 - Semantic Web (RDF/ OWL)
 - MPEG-7 (Multimedia Content Description Interface)
- Network infrastructure
 - High-speed networks
 - Mobility support
 - Mobile IP
 - Personal identification (RFID, smart card)
 - Data sharing protocol -- Web service, Peer-to-peer network

Conclusion

- Next-generation E-learning
 - Multilingual contents
 - Ubiquitous access
 - Shared and reusable contents
- Technological integration will be required
- Cooperation will accelerate development of next-generation E-learning