LABORATORIO 6 Felipe Calvache – Jeisson Sanchez

**PUNTO UNO. Sólo XML. CATÁLOGO DE CURSOS (courses.xml)**

El caso es uno de los propuestos en el curso de bases de datos de **Stanford.**

**A.** **Explorando**

**1.** **Explore el archivo usando un navegador y un editor. ¿Cuáles son las ventajas de uno u otro?**

Ventajas del navegador:

* Los navegadores web suelen mostrar el contenido del XML con sangrías y una estructura más clara, lo que facilita la lectura.
* Permiten colapsar y expandir nodos en el XML, lo que facilita la navegación por archivos cuando es muy grande o tiene mucha información.
* No requiere instalación de software adicional si ya tienes un navegador web.

Ventajas del editor:

* Puedes modificar directamente el contenido del XML, algo que no todos los navegadores permiten.
* Los editores de texto tienen herramientas avanzadas de búsqueda y reemplazo que facilitan la localización y modificación de información específica.

**2. Describa la información que encuentra en el archivo.**

Básicamente el archivo XML se organiza en torno a un elemento raíz llamado **<Course\_Catalog>** que contiene varios departamentos. Cada departamento está representado por un elemento **<Department>** que incluye atributos y subelementos que describen los cursos, los profesores y otras características relacionadas.

**B. Consultas iniciales**

**Implemente las siguientes consultas:**

1. **¿De cuáles cursos se tiene información?**

**[a. Nombre con etiqueta] [b. Nombre sin etiqueta] [c. Número con atributo] [d. Número sin atributo][e. Número total de cursos]**

**A.** Course\_Catalog/Department/Course/Title

**Element='<Title>Programming Methodology</Title>'**

**Element='<Title>Programming Abstractions</Title>'**

**Element='<Title>Computer Organization and Systems</Title>'**

**Element='<Title>Introduction to Probability for Computer Scientists</Title>'**

**Element='<Title>From Languages to Information</Title>'**

**Element='<Title>Compilers</Title>'**

**Element='<Title>Introduction to Databases</Title>'**

**Element='<Title>Artificial Intelligence: Principles and Techniques</Title>'**

**Element='<Title>Structured Probabilistic Models: Principles and Techniques</Title>'**

**Element='<Title>Machine Learning</Title>'**

**Element='<Title>Digital Systems I</Title>'**

**Element='<Title>Digital Systems II</Title>'**

**Element='<Title>From Languages to Information</Title>'**

**B.** Course\_Catalog/Department/Course/Title/text()

**Text='Programming Methodology'**

**Text='Programming Abstractions'**

**Text='Computer Organization and Systems'**

**Text='Introduction to Probability for Computer Scientists'**

**Text='From Languages to Information'**

**Text='Compilers'**

**Text='Introduction to Databases'**

**Text='Artificial Intelligence: Principles and Techniques'**

**Text='Structured Probabilistic Models: Principles and Techniques'**

**Text='Machine Learning'**

**Text='Digital Systems I'**

**Text='Digital Systems II'**

**Text='From Languages to Information'**

**C.** Course\_Catalog/Department/Course/@Number

Attribute='Number=CS106A'

Attribute='Number=CS106B'

Attribute='Number=CS107'

Attribute='Number=CS109'

Attribute='Number=CS124'

Attribute='Number=CS143'

Attribute='Number=CS145'

Attribute='Number=CS221'

Attribute='Number=CS228'

Attribute='Number=CS229'

Attribute='Number=EE108A'

Attribute='Number=EE108B'

Attribute='Number=LING180'

**D.** Course\_Catalog/Department/Course/@Number/data()

**UntypedAtomic='CS106A'**

**UntypedAtomic='CS106B'**

**UntypedAtomic='CS107'**

**UntypedAtomic='CS109'**

**UntypedAtomic='CS124'**

**UntypedAtomic='CS143'**

**UntypedAtomic='CS145'**

**UntypedAtomic='CS221'**

**UntypedAtomic='CS228'**

**UntypedAtomic='CS229'**

**UntypedAtomic='EE108A'**

**UntypedAtomic='EE108B'**

**UntypedAtomic='LING180'**

**E.** count(/Course\_Catalog/Department/Course)

Int64='13'

1. **¿Cuál es la información del curso Machine Learning?**

**[a. Toda la información] [b. Todos los atributos] [c. Todas las etiquetas]**

**A.** Course\_Catalog/Department/Course[@Number = "CS229"]

Element='<Course Enrollment="320" Number="CS229">

<Title>Machine Learning</Title>

<Description>A broad introduction to machine learning and statistical pattern recognition.</Description>

<Instructors>

<Professor>

<First\_Name>Andrew</First\_Name>

<Last\_Name>Ng</Last\_Name>

</Professor>

</Instructors>

</Course>'

**B.** Course\_Catalog/Department/Course[@Number = "CS229"]/@\*

Attribute='Enrollment=320'

Attribute='Number=CS229'

**C.** Course\_Catalog/Department/Course[@Number = "CS229"]/\*

**Element='<Title>Machine Learning</Title>'**

**Element='<Description>A broad introduction to machine learning and statistical pattern recognition.</Description>'**

**Element='<Instructors>**

**<Professor>**

**<First\_Name>Andrew</First\_Name>**

**<Last\_Name>Ng</Last\_Name>**

**</Professor>**

**</Instructors>'**

1. **¿Cuántos departamentos tenemos? ¿Cuales son?[Nombre]**

**A.** Course\_Catalog/Department/Title/text()

**Text='Computer Science'**

**Text='Electrical Engineering'**

**Text='Linguistics'**

1. **¿A qué departamento pertenece el curso Machine Learning? [Código]**

Course\_Catalog/Department[Course/Title='Machine Learning']/@Code

Attribute='Code=CS'

1. **¿Cuáles cursos son iniciales (no tienen prerrequisitos)? [Nombre]**

Course\_Catalog/Department/Course[not(Prerequisites)]/Title/text()

Text='Programming Methodology'

Text='Artificial Intelligence: Principles and Techniques'

Text='Structured Probabilistic Models: Principles and Techniques'

Text='Machine Learning'

Text='Digital Systems I'

1. **¿Cuáles cursos son finales (no son prerrequisitos de ninguno)? [Nombre]**

/Course\_Catalog/Department/Course[not(@Number = /Course\_Catalog/Department/Course/Prerequisites/Prereq/text())]/Title

Element='<Title>From Languages to Information</Title>'

Element='<Title>Compilers</Title>'

Element='<Title>Introduction to Databases</Title>'

Element='<Title>Artificial Intelligence: Principles and Techniques</Title>'

Element='<Title>Structured Probabilistic Models: Principles and Techniques</Title>'

Element='<Title>Machine Learning</Title>'

Element='<Title>Digital Systems II</Title>'

Element='<Title>From Languages to Information</Title>'

1. **¿Cuáles directores de departamento son profesores de cursos del departamento?[La información del director]**

Course\_Catalog/Department[Course/Instructors/Professor/Last\_Name = Chair/Professor/Last\_Name]

Element='<Department Code="CS">

<Title>Computer Science</Title>

<Chair>

<Professor>

<First\_Name>Jennifer</First\_Name>

<Last\_Name>Widom</Last\_Name>

</Professor>

</Chair>

1. **¿Cuál es el total de inscripciones de los cursos?**

sum(/Course\_Catalog/Department/Course/@Enrollment)

Double='3420'

1. **¿De cuáles cursos no se conoce el número de inscritos? [Nombre]**

Course\_Catalog/Department/Course[not(@Enrollment)]/Title

Element='<Title>Digital Systems I</Title>'

Element='<Title>Digital Systems II</Title>'

1. **¿Cuál curso tiene el mayor número de inscritos? [Nombre]**

Course\_Catalog/Department/Course[@Enrollment = max(//Course/@Enrollment)]/Title/text()

Text='Programming Methodology'

**B. Consultas quiz Standford**

1. **Return all Title elements (of both departments and courses). (16)**

/Course\_Catalog// Title/text()

Text='Computer Science'

Text='Programming Methodology'

Text='Programming Abstractions'

Text='Computer Organization and Systems'

Text='Introduction to Probability for Computer Scientists'

Text='From Languages to Information'

Text='Compilers'

Text='Introduction to Databases'

Text='Artificial Intelligence: Principles and Techniques'

Text='Structured Probabilistic Models: Principles and Techniques'

Text='Machine Learning'

Text='Electrical Engineering'

Text='Digital Systems I'

Text='Digital Systems II'

Text='Linguistics'

Text='From Languages to Information'

1. **Return last names of all department chairs. (3)**

// Chair / Professor / Last\_Name

Element='<Last\_Name>Widom</Last\_Name>'

Element='<Last\_Name>Horowitz</Last\_Name>'

Element='<Last\_Name>Levin</Last\_Name>'

1. **Return titles of courses with enrollment greater than 500. (2)**

/Course\_Catalog/ Department/Course[@Enrollment > 500]/Title

Element='<Title>Programming Methodology</Title>'

Element='<Title>Programming Abstractions</Title>'

1. **Return titles of departments that have some course that takes "CS106B" as a prerequisite. (2)**

/Course\_Catalog/ Department [Course/Prerequisites/Prereq = "CS106B" ] / Title

Element='<Title>Computer Science</Title>'

Element='<Title>Electrical Engineering</Title>'

1. **Return last names of all professors or lecturers who use a middle initial. Don't worry about eliminating duplicates. (5)**

//( Professor | Lecturer ) [ Middle\_Initial ] /Last\_Name

Element='<Last\_Name>Cain</Last\_Name>'

Element='<Last\_Name>Cain</Last\_Name>'

Element='<Last\_Name>Aiken</Last\_Name>'

Element='<Last\_Name>Horowitz</Last\_Name>'

Element='<Last\_Name>Dally</Last\_Name>'

1. **Return the title of courses that have a cross-listed course (i.e., that have "Cross-listed" in their description). (2)**

//Course[contains(Description, "Cross-listed")]/Title

Element='<Title>From Languages to Information</Title>'

Element='<Title>From Languages to Information</Title>'

1. **Return the enrollment of all courses in the CS department. (10)**

/Course\_Catalog/Department[@Code='CS']/Course/@Enrollment

Attribute='Enrollment=1070'

Attribute='Enrollment=620'

Attribute='Enrollment=500'

Attribute='Enrollment=280'

Attribute='Enrollment=60'

Attribute='Enrollment=90'

Attribute='Enrollment=130'

Attribute='Enrollment=180'

Attribute='Enrollment=110'

Attribute='Enrollment=320'

1. **Return last names of instructors teaching at least one course that has "system" in its description and enrollment greater than 100. (2)**

/Course\_Catalog/ Department/Course[@Enrollment > 100 and contains (Description, "system")] //( Professor | Lecturer ) / Last\_Name

Element='<Last\_Name>Zelenski</Last\_Name>'

Element='<Last\_Name>Widom</Last\_Name>'

1. **Return the title of the course with more than 2 instructors (\*)(1)**

/Course\_Catalog/Department/Course[count(Instructors/\*) > 2]/Title

Element='<Title>Programming Methodology</Title>'

1. **Return course numbers of courses that have the same title as some other course. (Hint: You might want to use the "preceding" and "following" navigation axes for this query, which were not covered in the video or our demo script; they match any preceding or following node, not just siblings.) (2)**

//Course[Title = following:: \*/ Title or Title = preceding::\*/ Title] / data(@Number)

UntypedAtomic='CS124'

UntypedAtomic='LING180'

1. **Return the courses numbers of courses that have no lecturers as instructors. (\*)(10)**

/Course\_Catalog/Department/Course[not(Instructors/Lecturer)]/@Number

Attribute='Number=CS109'

Attribute='Number=CS124'

Attribute='Number=CS143'

Attribute='Number=CS145'

Attribute='Number=CS221'

Attribute='Number=CS228'

Attribute='Number=CS229'

Attribute='Number=EE108A'

Attribute='Number=EE108B'

Attribute='Number=LING180'

1. **Return titles of courses taught by the chair of a department. For this question, you may assume that all professors have distinct last names. (1)**

//Course[Instructors/Professor/Last\_Name = //Department/Chair/ Professor /Last\_Name] / Title

Element='<Title>Introduction to Databases</Title>'

1. **Return titles of courses taught by a professor with the last name "Ng" and by a professor with the last name "Thrun". (\*)(1)**

/Course\_Catalog/Department/Course[Instructors/Professor[Last\_Name='Ng'] and Instructors/Professor[Last\_Name='Thrun']]/Title

Element='<Title>Artificial Intelligence: Principles and Techniques</Title>'

1. **Return course numbers of courses that have a course taught by Eric Roberts as a prerequisite. (4)**

/Course\_Catalog/Department/Course[Prerequisites/Prereq =../../Department/Course[Instructors//First\_Name = 'Eric' and Instructors//Last\_Name = 'Roberts']/@Number]/@Number

Attribute='Number=CS106B'

Attribute='Number=CS107'

Attribute='Number=CS109'

Attribute='Number=EE108B'

1. **Return last names of instructors teaching at least one course that has system in its description and enrollment greater than 100.(2)**

/Course\_Catalog/Department/Course[contains(Description, 'system') and @Enrollment > 100]/Instructors/\*/Last\_Name

Element='<Last\_Name>Zelenski</Last\_Name>'

Element='<Last\_Name>Widom</Last\_Name>'

**C. Consultas Propias**

**Propongan e implementen cinco consultas propias**

1. **Devolver el nombre del curso cuya descripción incluye la palabra "introducción" y tienen menos de 100 inscritos:**

Course\_Catalog/Department/Course[contains(Description, 'introduction') and @Enrollment > 100]/Title

Element='<Title>Machine Learning</Title>'

1. **Devolver los títulos de los cursos que tienen un profesor con el primer nombre "Eric":**

/Course\_Catalog/Department/Course[Instructors/Professor/First\_Name = 'Eric']/Title

Element='<Title>Programming Methodology</Title>'

Element='<Title>Programming Abstractions</Title>'

1. **Devolver los códigos de cursos que son requisitos para al menos otros tres cursos.**/Course\_Catalog/Department/Course[count(//Prereq) >= 3]/@Number

Attribute='Number=CS106A'

Attribute='Number=CS106B'

Attribute='Number=CS107'

Attribute='Number=CS109'

Attribute='Number=CS124'

Attribute='Number=CS143'

Attribute='Number=CS145'

Attribute='Number=CS221'

Attribute='Number=CS228'

Attribute='Number=CS229'

Attribute='Number=EE108A'

Attribute='Number=EE108B'

Attribute='Number=LING180'

1. **Obtener los títulos de los cursos que tienen más de 500 inscritos:**

/Course\_Catalog/Department/Course[@Enrollment > 500]/Title

Element='<Title>Programming Methodology</Title>'

Element='<Title>Programming Abstractions</Title>'

1. **Obtener los nombres de los profesores que enseñan cursos en el departamento de Ciencias de la Computación**

/Course\_Catalog/Department[@Code='CS']/Course/Instructors/Professor/First\_Name

Element='<First\_Name>Eric</First\_Name>'

Element='<First\_Name>Mehran</First\_Name>'

Element='<First\_Name>Eric</First\_Name>'

Element='<First\_Name>Mehran</First\_Name>'

Element='<First\_Name>Dan</First\_Name>'

Element='<First\_Name>Alex</First\_Name>'

Element='<First\_Name>Jennifer</First\_Name>'

Element='<First\_Name>Andrew</First\_Name>'

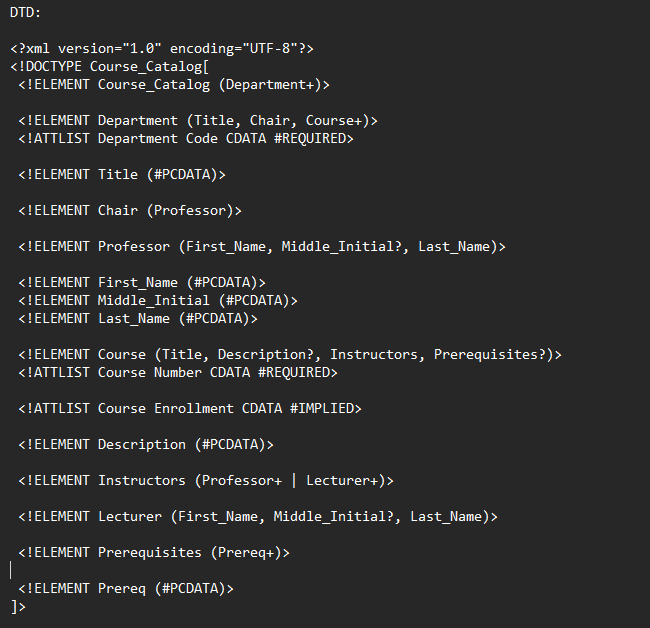
Element='<First\_Name>Sebastian</First\_Name>'

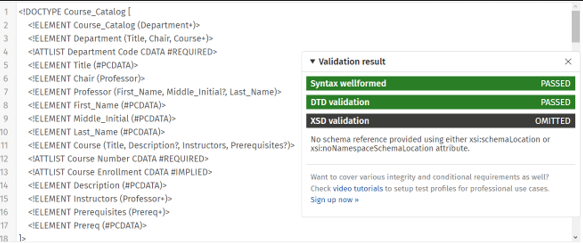
Element='<First\_Name>Daphne</First\_Name>'

Element='<First\_Name>Andrew</First\_Name>'

**D. Esquema**

**Proponga un DTD para estos datos.**





**E. Nuevos Datos**

**Incluya en el archivo la información de tres cursos que no existan en el archivo. Verifique**

**que cumple el esquema definido anteriormente.**

**-- Primer curso**

<Course Number="CS250" Enrollment="70">

<Title>Blockchain Technology</Title>

<Description>Introduction to the principles and practice of blockchain technology.</Description>

<Instructors>

<Lecturer>

<First\_Name>Felipe</First\_Name>

<Last\_Name>Calvache</Last\_Name>

</Lecturer>

<Professor>

<First\_Name>Ana</First\_Name>

<Last\_Name>Rincon</Last\_Name>

</Professor>

</Instructors>

</Course>

**-- Segundo Curso**

<Course Number="CS260" Enrollment="85">

<Title>Quantum Computing</Title>

<Description>Fundamentals of quantum computing and its applications.</Description>

<Instructors>

<Lecturer>

<First\_Name>Radamel</First\_Name>

<Middle\_Initial>G.</Middle\_Initial>

<Last\_Name>Falcao</Last\_Name>

</Lecturer>

<Professor>

<First\_Name>Jeison</First\_Name>

<Last\_Name>Casallas</Last\_Name>

</Professor>

</Instructors>

<Prerequisites>

<Prereq>CS107</Prereq>

</Prerequisites>

</Course>

**-- Tercer Curso**

<Course Number="CS270" Enrollment="95">

<Title>Operating Systems</Title>

<Description>It acts as an intermediary between the hardware and the user, managing system resources and allowing applications to run.</Description>

<Instructors>

<Professor>

<First\_Name>Irma</First\_Name>

<Last\_Name>Diaz</Last\_Name>

</Professor>

</Instructors>

<Prerequisites>

<Prereq>CS229</Prereq>

</Prerequisites>

</Course>

**RETROSPECTIVA**

1. **¿Cuál fue el tiempo total invertido en el laboratorio por cada uno de ustedes?(Horas/Hombre)**

Jeisson: 14 horas

Felipe: 14 Horas

1. **¿Cuál es el estado actual del laboratorio? ¿Por qué?**

Parcialmente completo, faltaron algunos detalles del segundo punto pero de resto está todo completo.

1. **¿Cuál consideran fue el mayor logro? ¿Por qué?**

Logramos entender un tema nuevo como lo es XML, y logramos implementar y desarrollar consultas.

1. **¿Cuál consideran que fue el mayor problema técnico? ¿Qué hicieron para**

**resolverlo?**

Al ser un tema nuevo y tan extenso, y al tener solamente 1 clase de explicación básicamente tocó recurrir a muchos videos y lecturas para entender completamente, es decir no íbamos tan preparados.

1. **¿Qué hicieron bien como equipo? ¿Qué se comprometen a hacer para mejorar los**

**resultados?**

Logramos complementar bien nuestros conocimientos para dar ideas y lograr resolver las consultas y realizar los demás ejercicios.