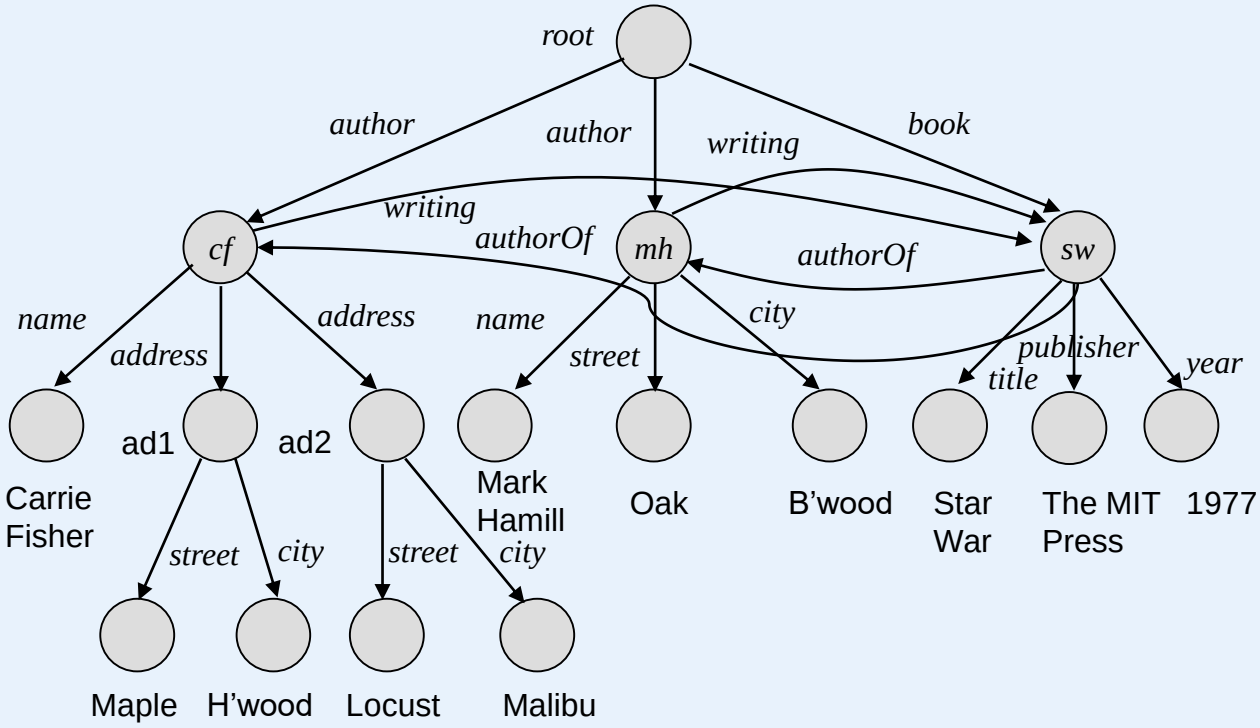
Assignment #2

Due: March 17, 2025

(sent to teaching assistant: Ms. R. Kondam, rasagnya53@gmail.com)

1. (15) Represent the following graph as an XML document.



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2. (15) The following is a DTD for books. Please produce an XML document conforming to the DTD.

```
<!DOCTYPE AuthorBook [
        <!ELEMENT AuthorBook            (Author*, Book*)>
        <!ELEMENT Author  (Name, Address+)>
                <!ATTLIST Author
                    AuthorId            ID              #REQUIRED
                    writing             INREFS          #IMPLIED
                >
        <!ELEMENT Name   (#PCDATA)>
        <!ELEMENT Address               (Street, City)>
        <!ELEMNT Street     (#PCDATA)>
        <!ELEMENT City      (#PCDATA)>
        <!ELEMENT Book     (Title, Publisher, Year)>
                <!ATTLIST               Book
                    BookIn              ID              #REQUIRED
                    authorOf            IDREFS          #REQUIRED
                >
        <!ELEMENT Title                 (#PCDATA)>
         <!ELEMENT Publisher            (#PCDATA)>
        <!ELEMENT Year      (#PCDATA)>
]>
```

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3. (15) Define an XML-schema which is equivalent to the DTD shown in Question 2.

4. (25) Write an algorithm to transform a simplified XPath expression (in which the subexpressions in any condition can be connected only with $\wedge$, e.g., /StarMovieData/Star[//City = "Malibu" and //Street = "123 Maple St."]/Name) to a tree structure.
(Hint:
1. First, generate a path *P* covering all the element names on the main path in XPath expression *X* (not including the element names in predicates.)
2. Check each element *e* on *P*. If *e* is associated with a predicate: $x_1 = a_1 \wedge x_2 = a_2 \wedge \ \ldots \wedge x_m = a_m$, make a series call of the algorithm recursively to generate a subtree for each x_i ($i = 1, \ldots, m$).
3. Make it clear how the subtrees generated for x_i's are connected to *P.*)

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5. (20) The following is a DTD for a set of documents on books.
   (a) Write an FLWR expression to find all the books authored by D. Knuth.
   (b) Write an FLWR expression to find all books published by Addison Wesley Longman in 2007.

```
<!DOCTYPE AuthorBook [
        <!ELEMENT AuthorBook            (Author*, Book*)>
        <!ELEMENT Author  (Name, Address+)>
                <!ATTLIST Author
                    AuthorId            ID          #REQUIRED
                    writing             INREFS      #IMPLIED
                >
        <!ELEMENT Name                  (#PCDATA)>
        <!ELEMENT Address               (Street, City)>
        <!ELEMNT Street                 (#PCDATA)>
        <!ELEMENT City                  (#PCDATA)>
        <!ELEMENT Book                  (Title, Publisher, Year)>
                <!ATTLIST               Book
                    BookIn              ID          #REQUIRED
                    authorOf            IDREFS      #REQUIRED
                >
        <!ELEMENT Title                 (#PCDATA)>
         <!ELEMENT Publisher            (#PCDATA)>
        <!ELEMENT Year     (#PCDATA)>
]>
```

6. (10) According to the above DTD, construct an Xpath expression to find the author's name who published a book entitles "Art of Programming" in 1972.