

CS6852: Theory and Applications of Ontologies :: 2023

ASSIGNMENT 1

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1. **Domain of choice:** DTD on tournament data:

The description of the DTD is as follows:

- a. Each **tournament** has zero or more **match** elements.
- b. *Attributes* of **tournament** are **tournament-name**, **start_date** & **end_date** which is a character data and a mandatory field
- c. **match** is an element having sub elements as **team** (one or more).
- d. The attributes of **match** are **match id**, **venue**, **status** (upcoming|ongoing|completed), **start_time**
Amongst the above **match_id**, **venue** and **start_time** is Character Data and Required
- e. **team** is an element having one or more sub elements.
- f. *Attributes* of team are **name**, **institute** which are character data and are required
- g. **player** is an *element* having sub element as **stats**
- h. *Attributes* of player are **name**, **role**, **jersey_number** which are Character Data and are Mandatory Fields
- i. **stats** is an *element* having sub elements as: **points_scored**, **rebounds**, **assists**
- j. **points_scored** is an *element* which is a parsed Character Data
- k. **rebounds** is an *element* of type parsed Character Data
- l. **assists** is an *element* of type parsed Character Data
- m. **total_score** is an *element* of type parsed character data

2. DTD FOR INTER-IIT BASKETBALL TOURNAMENT:

```
<?xml version="1.0"?>
<!DOCTYPE tournament [
<!ELEMENT tournament (match*)>

<!--
<!-- tournament
<!-- tournament-name CDATA #REQUIRED
start_date CDATA #REQUIRED
end_date CDATA #REQUIRED>

<!--
<!-- match
<!-- match id CDATA #REQUIRED
venue CDATA #REQUIRED
status (upcoming|ongoing|completed) #REQUIRED
start_time CDATA #REQUIRED>

<!--
<!-- team
<!-- team (player+, total_score?)>

<!--
<!-- team name CDATA #REQUIRED
institute CDATA #REQUIRED>

<!--
<!-- player
<!-- player name CDATA #REQUIRED
role CDATA #REQUIRED
jersey_number CDATA #REQUIRED>

<!--
<!-- stats
<!-- stats (points_scored, rebounds, assists)>
<!-- points_scored (#PCDATA)>
<!-- rebounds (#PCDATA)>
<!-- assists (#PCDATA)>
<!-- total_score (#PCDATA)>
]>
```

3. POPULATED XML FOR THE ABOVE PROPOSED DTD:

```
<tournament>
  <sport name="Basketball">
    <event name="Inter-IIT Basketball" start_date="2023-04-01" end_date="2023-
04-07">
      <match id="1" venue="IIT Madras Basketball court" status="completed"
start_time="2023-04-01T19:00:00">
        <team name="IIT Madras" institute="IIT Madras">
          <player name="Amit Sharma" role="Point Guard" jersey_number="5">
            <stats>
              <points_scored>12</points_scored>
              <rebounds>4</rebounds>
              <assists>7</assists>
            </stats>
          </player>
          <player name="Rajesh Patel" role="Small Forward" jersey_number="10">
            <stats>
              <points_scored>15</points_scored>
              <rebounds>6</rebounds>
              <assists>3</assists>
            </stats>
          </player>
          <player name="Sandeep Singh" role="Power Forward" jersey_number="12">
            <stats>
              <points_scored>18</points_scored>
              <rebounds>10</rebounds>
              <assists>2</assists>
            </stats>
          </player>
          <player name="Anil Kumar" role="Centre" jersey_number="17">
            <stats>
              <points_scored>8</points_scored>
              <rebounds>12</rebounds>
              <assists>5</assists>
            </stats>
          </player>
          <player name="Rohit Gupta" role="Shooting Guard" jersey_number="23">
            <stats>
              <points_scored>7</points_scored>
              <rebounds>2</rebounds>
              <assists>4</assists>
            </stats>
          </player>
        </team>
        <total_score>60</total_score>
```

```
<team name="IIT Bombay" institute="IIT Bombay">
  <player name="Prakash Singh" role="Point Guard" jersey_number="4">
    <stats>
      <points_scored>10</points_scored>
      <rebounds>2</rebounds>
      <assists>8</assists>
    </stats>
  </player>
  <player name="Deepak Patel" role="Small Forward" jersey_number="8">
    <stats>
      <points_scored>14</points_scored>
      <rebounds>4</rebounds>
      <assists>4</assists>
    </stats>
  </player>
  <player name="Alok Singh" role="Power Forward" jersey_number="13">
    <stats>
      <points_scored>12</points_scored>
      <rebounds>8</rebounds>
      <assists>5</assists>
    </stats>
  </player>
  <player name="Harpal Singh" role="Centre" jersey_number="1">
    <stats>
      <points_scored>12</points_scored>
      <rebounds>3</rebounds>
      <assists>1</assists>
    </stats>
  </player>
  <player name="Pankaj Singh" role="Shooting Guard" jersey_number="3">
    <stats>
      <points_scored>22</points_scored>
      <rebounds>3</rebounds>
      <assists>2</assists>
    </stats>
  </player>
</team>
<total_score>70</total_score>
</match>
```

```
<match id="2" venue="IIT Madras Basketball court" status="completed"
start_time="2023-04-02T19:00:00">
  <team name="IIT Mandi" institute="IIT Mandi">
    <player name="Berranno Nandi" role="Point Guard" jersey_number="22">
      <stats>
        <points_scored>11</points_scored>
        <rebounds>5</rebounds>
        <assists>6</assists>
      </stats>
    </player>
    <player name="Suraj Kumar" role="Small Forward" jersey_number="11">
      <stats>
        <points_scored>16</points_scored>
        <rebounds>6</rebounds>
        <assists>5</assists>
      </stats>
    </player>
    <player name="Bibhuti Majhi" role="Power Forward" jersey_number="23">
      <stats>
        <points_scored>16</points_scored>
        <rebounds>10</rebounds>
        <assists>8</assists>
      </stats>
    </player>
    <player name="Amit Kumar" role="Centre" jersey_number="65">
      <stats>
        <points_scored>10</points_scored>
        <rebounds>9</rebounds>
        <assists>7</assists>
      </stats>
    </player>
    <player name="Sawan Anand" role="Shooting Guard" jersey_number="03">
      <stats>
        <points_scored>6</points_scored>
        <rebounds>3</rebounds>
        <assists>5</assists>
      </stats>
    </player>
  </team>
  <total_score>59</total_score>
```

```
<team name="IIT Dhanbad" institute="IIT Dhanbad">
  <player name="Subham Poddar" role="Point Guard" jersey_number="10">
    <stats>
      <points_scored>18</points_scored>
      <rebounds>5</rebounds>
      <assists>11</assists>
    </stats>
  </player>
  <player name="Akash Roy" role="Small Forward" jersey_number="55">
    <stats>
      <points_scored>15</points_scored>
      <rebounds>5</rebounds>
      <assists>5</assists>
    </stats>
  </player>
  <player name="Ravi Kumar" role="Power Forward" jersey_number="89">
    <stats>
      <points_scored>15</points_scored>
      <rebounds>7</rebounds>
      <assists>6</assists>
    </stats>
  </player>
  <player name="Harshit Ganda" role="Small Forward" jersey_number="04">
    <stats>
      <points_scored>10</points_scored>
      <rebounds>2</rebounds>
      <assists>4</assists>
    </stats>
  </player>
  <player name="Alok Gogoi" role="Shooting Guard" jersey_number="72">
    <stats>
      <points_scored>23</points_scored>
      <rebounds>5</rebounds>
      <assists>5</assists>
    </stats>
  </player>
</team>
<total_score>81</total_score>
</match>
```

```
<match id="3" venue="IIT Madras Basketball court" status="completed"
start_time="2023-04-03T19:00:00">
  <team name="IIT Delhi" institute="IIT Delhi">
    <player name="Raunak Singh" role="Point Guard" jersey_number="12">
      <stats>
        <points_scored>11</points_scored>
        <rebounds>5</rebounds>
        <assists>6</assists>
      </stats>
    </player>
    <player name="Sunil Singha" role="Small Forward" jersey_number="21">
      <stats>
        <points_scored>14</points_scored>
        <rebounds>6</rebounds>
        <assists>3</assists>
      </stats>
    </player>
    <player name="Ashutosh Dev" role="Power Forward" jersey_number="56">
      <stats>
        <points_scored>17</points_scored>
        <rebounds>7</rebounds>
        <assists>5</assists>
      </stats>
    </player>
    <player name="Anadeep Bandharu" role="Centre" jersey_number="51">
      <stats>
        <points_scored>8</points_scored>
        <rebounds>12</rebounds>
        <assists>3</assists>
      </stats>
    </player>
    <player name="Rahul Kurmi" role="Shooting Guard" jersey_number="19">
      <stats>
        <points_scored>8</points_scored>
        <rebounds>2</rebounds>
        <assists>6</assists>
      </stats>
    </player>
  </team>
  <total_score>58</total_score>
```

```
<team name="IIT Kanpur" institute="IIT Kanpur">
  <player name="Suraj Prasad" role="Point Guard" jersey_number="40">
    <stats>
      <points_scored>12</points_scored>
      <rebounds>8</rebounds>
      <assists>8</assists>
    </stats>
  </player>
  <player name="Aman Singh" role="Small Forward" jersey_number="8">
    <stats>
      <points_scored>14</points_scored>
      <rebounds>4</rebounds>
      <assists>4</assists>
    </stats>
  </player>
  <player name="Sandeep Lala" role="Power Forward" jersey_number="100">
    <stats>
      <points_scored>11</points_scored>
      <rebounds>7</rebounds>
      <assists>6</assists>
    </stats>
  </player>
  <player name="Harish Singh" role="Centre" jersey_number="99">
    <stats>
      <points_scored>10</points_scored>
      <rebounds>4</rebounds>
      <assists>7</assists>
    </stats>
  </player>
  <player name="Rahul Das" role="Power gurad" jersey_number="59">
    <stats>
      <points_scored>20</points_scored>
      <rebounds>6</rebounds>
      <assists>9</assists>
    </stats>
  </player>
</team>
<total_score>67</total_score>
</match>
```



```
<match id="4" venue="IIT Madras Basketball court" status="completed"
start_time="2023-04-04T19:00:00">
  <team name="IIT Guwahati" institute="IIT Guwahati">
    <player name="Sumit Sharma" role="Point Guard" jersey_number="5">
      <stats>
        <points_scored>8</points_scored>
        <rebounds>4</rebounds>
        <assists>7</assists>
      </stats>
    </player>
    <player name="Ram Prasad Kumar" role="Small Forward"
jersey_number="50">
      <stats>
        <points_scored>12</points_scored>
        <rebounds>6</rebounds>
        <assists>5</assists>
      </stats>
    </player>
    <player name="Shankadeep Singh" role="Power Forward"
jersey_number="82">
      <stats>
        <points_scored>20</points_scored>
        <rebounds>10</rebounds>
        <assists>6</assists>
      </stats>
    </player>
    <player name="Jaydeep Varun" role="Centre" jersey_number="27">
      <stats>
        <points_scored>10</points_scored>
        <rebounds>11</rebounds>
        <assists>6</assists>
      </stats>
    </player>
    <player name="Sekhar Gupta" role="Shooting Guard" jersey_number="80">
      <stats>
        <points_scored>9</points_scored>
        <rebounds>2</rebounds>
        <assists>4</assists>
      </stats>
    </player>
  </team>
  <total_score>49</total_score>
```

```
<team name="IIT BHU" institute="IIT BHU">
  <player name="Suraj Thakur" role="Point Guard" jersey_number="56">
    <stats>
      <points_scored>13</points_scored>
      <rebounds>2</rebounds>
      <assists>10</assists>
    </stats>
  </player>
  <player name="Rupak Gupta" role="Small Forward" jersey_number="88">
    <stats>
      <points_scored>10</points_scored>
      <rebounds>3</rebounds>
      <assists>8</assists>
    </stats>
  </player>
  <player name="Prem Jeet Singh" role="Power Forward" jersey_number="53">
    <stats>
      <points_scored>15</points_scored>
      <rebounds>6</rebounds>
      <assists>7</assists>
    </stats>
  </player>
  <player name="Nandan Bhowmik" role="Shooting Guard"
jersey_number="64">
    <stats>
      <points_scored>20</points_scored>
      <rebounds>9</rebounds>
      <assists>8</assists>
    </stats>
  </player>
  <player name="Sushant Rajput" role="Power gurad" jersey_number="15">
    <stats>
      <points_scored>15</points_scored>
      <rebounds>11</rebounds>
      <assists>5</assists>
    </stats>
  </player>
</team>
<total_score>73</total_score>
</match>
</event>
</sport>
</tournament>
```

X-Path: -

1. **INPUT: -** [/tournament/match[1]/team[2]/player/@name | /tournament/match[1]/team[2]/player/@role: **Select the name and role of all players in the second team of the first match]**

OUTPUT: - [Attribute='name=Prakash Singh'
Attribute='role=Point Guard'
Attribute='name=Deepak Patel'
Attribute='role=Small Forward'
Attribute='name=Alok Singh'
Attribute='role=Power Forward'
Attribute='name=Harpal Singh'
Attribute='role=Centre'
Attribute='name=Pankaj Singh'
Attribute='role=Shooting Guard'
]

2. **INPUT: -** [/tournament/match[1]/team[1]/player[4]/stats/points_scored: **Select the points scored by the fourth player in the first team of the first match]**

OUTPUT: - [Element='<points_scored>8</points_scored>']

3. **INPUT: -** [/tournament/match[@id='Match ID']/team/player[stats/points_scored > X] : **Select all players who have scored more than a specific number of points in a specific match]**

OUTPUT: - [Element='<player jersey_number="10" name="Subham Poddar" role="Point Guard">
<stats>
<points_scored>18</points_scored>
<rebounds>5</rebounds>
<assists>11</assists>
</stats>
</player>'

Element='<player jersey_number="72" name="Alok Gogoi" role="Shooting Guard">
<stats>
<points_scored>23</points_scored>
<rebounds>5</rebounds>
<assists>5</assists>
</stats>
</player>'

]

4. **INPUT:** - [//team[player[@role='Power Forward' and stats/points_scored > 15]]/@name: **Selects the name attribute of all team elements that have a player element with a role attribute equal to "Power Forward" and have scored more than 15 points.]**

```
OUTPUT: - [ Attribute='name=IIT Madras'  
Attribute='name=IIT Mandi'  
Attribute='name=IIT Delhi'  
Attribute='name=IIT Guwahati'  
]
```

5. **INPUT:** - [//player[contains(@name, 'Singh')]/@name: **Selects the name attribute of all player elements whose name attribute contains the substring "Singh".]**

```
OUTPUT: - [ Attribute='name=Sandeep Singh'  
Attribute='name=Prakash Singh'  
Attribute='name=Alok Singh'  
Attribute='name=Harpal Singh'  
Attribute='name=Pankaj Singh'  
Attribute='name=Raunak Singh'  
Attribute='name=Sunil Singha'  
Attribute='name=Aman Singh'  
Attribute='name=Harish Singh'  
Attribute='name=Shankadeep Singh'  
Attribute='name=Prem Jeet Singh'  
]
```

X-Query: -

1. **INPUT: - Select the name and role of all players in the second team of the first match**

```
[for $player in //match[@id = "1"]/team[2]/player  
return concat("Name: ", $player/@name, ", Role: ", $player/@role)]
```

OUTPUT: - [Name: Prakash Singh, Role: Point Guard
Name: Deepak Patel, Role: Small Forward
Name: Alok Singh, Role: Power Forward
Name: Harpal Singh, Role: Centre
Name: Pankaj Singh, Role: Shooting Guard]

2. **INPUT: - Select the points scored by the fourth player in the first team of the first match.**

```
for $match in /tournament/match[1]  
  for $team in $match/team[1]  
    for $player in $team/player[4]  
      return $player/stats/points_scored
```

OUTPUT: - [8]

3. **INPUT: - Select all players who have scored more than a specific number of points in a specific match**

```
for $match in /tournament/match[@id='2']  
  for $team in $match/team  
    for $player in $team/player[stats/points_scored > 17]  
      return $player/@name
```

OUTPUT: - [Subham Poddar
Alok Gogoi
]

4. **INPUT:** - Selects the name attribute of all team elements that have a player element with a role attribute equal to "Power Forward" and have scored more than 15 points.

```
for $t in //team[player[@role='Power Forward' and stats/points_scored > 15]]  
    return $t/@name
```

OUTPUT: - [IIT Madras
IIT Mandi
IIT Delhi
IIT Guwahati]

5. **INPUT:** - Selects the name attribute of all player elements whose name attribute contains the substring "Singh".

```
for $player in //player[contains(@name, 'Singh')]  
    return $player/@name
```

OUTPUT: - [Sandeep Singh
Prakash Singh
Alok Singh
Harpal Singh
Pankaj Singh
Raunak Singh
Sunil Singha
Aman Singh
Harish Singh
Shankadeep Singh
Prem Jeet Singh
]