FXL：A Form Exchange Language of Modular Forms for Program Specification Documents

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第5回プログラミングおよび応用のシステムに関するワークショップ SPA ’02

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  対象, 背景, 歴史, 目的など
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  システム構造, データ構造, 内部コード
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1. Introduction

1.1 Target

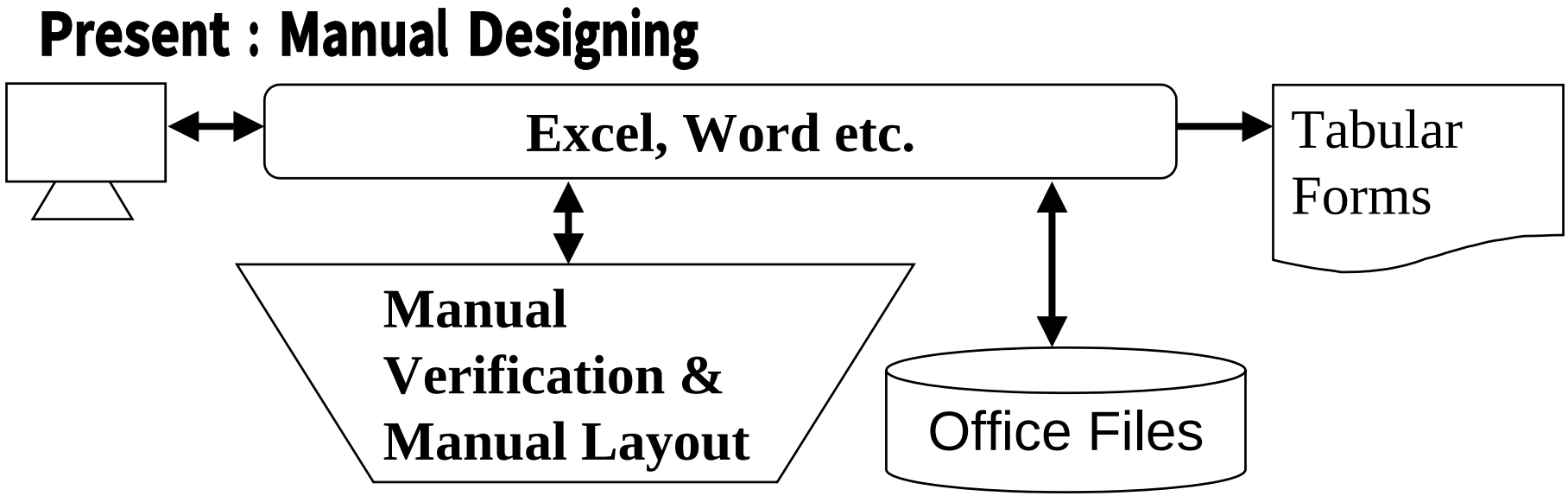
Tabular Form and Graph Grammar

Program Name:	
Subtitle:	
Library Code:	Version:
Author:	Original Release:
Approver:	Current Release:
Problem Description:	
Problem Supplementary Information (Theoretical Principles, Methods and References):	
Problem Solution: 1.Conventions and Terminology 2.Principles and Algorithms	

Program Specification Form

- **To Guide Syntactically Valid Items by Productions**
- **To Evaluate the Impact Area of Rewriting by Productions**
- **Automatic Drawing by Attribute Rules**

1.2 Background and Position



1.3 Background 2

Program Diagrams

Hichart, PAD, SPD, HCP
(1980's)

↓

DXL code (BNF)
JIS (1995)

H-Code2 (BNF)
Miyadera (1997)

→

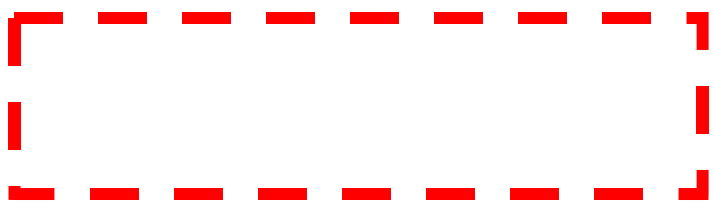
Program Specification

ISO6592
(1985)

↓

Hiform
Sugita et al. (1997)

↓



1.4 Motivation

- Common data formats among tabular form processing systems are required. (cf. DXL)

1.5 Purpose

- To design a system structure for all processing system
- To design data formats of the system

1.6 Results

1. We determine the system structure and the file structures of tabular form processing system based on graph grammar. (Section 3)

2. We determine data formats of the system. (Section 4)

2. Preliminaries

2.1 Modular Tables : Example Hiform [Sugita, 1998]

- Hiform includes all items in ISO6592
- Hiform consists of 17 types of forms

Program Name:	
Subtitle:	
Library Code:	Version:
Author:	Original Release:
Approver:	Current Release:
Problem Description:	
Problem Supplementary Information (Theoretical Principles, Methods and References):	
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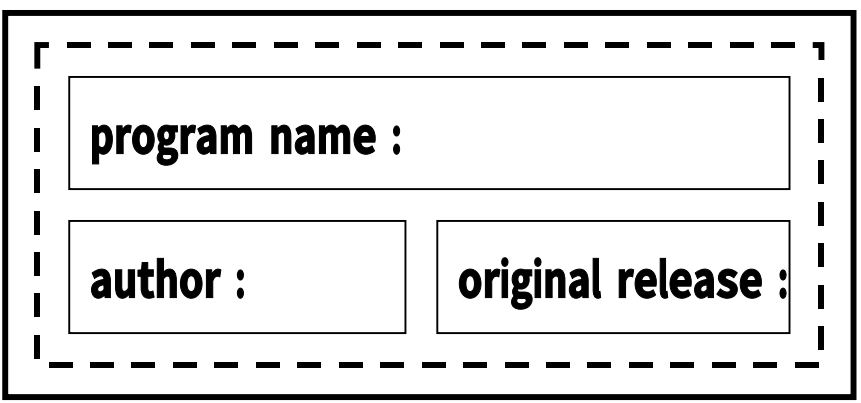
Program Specification Form

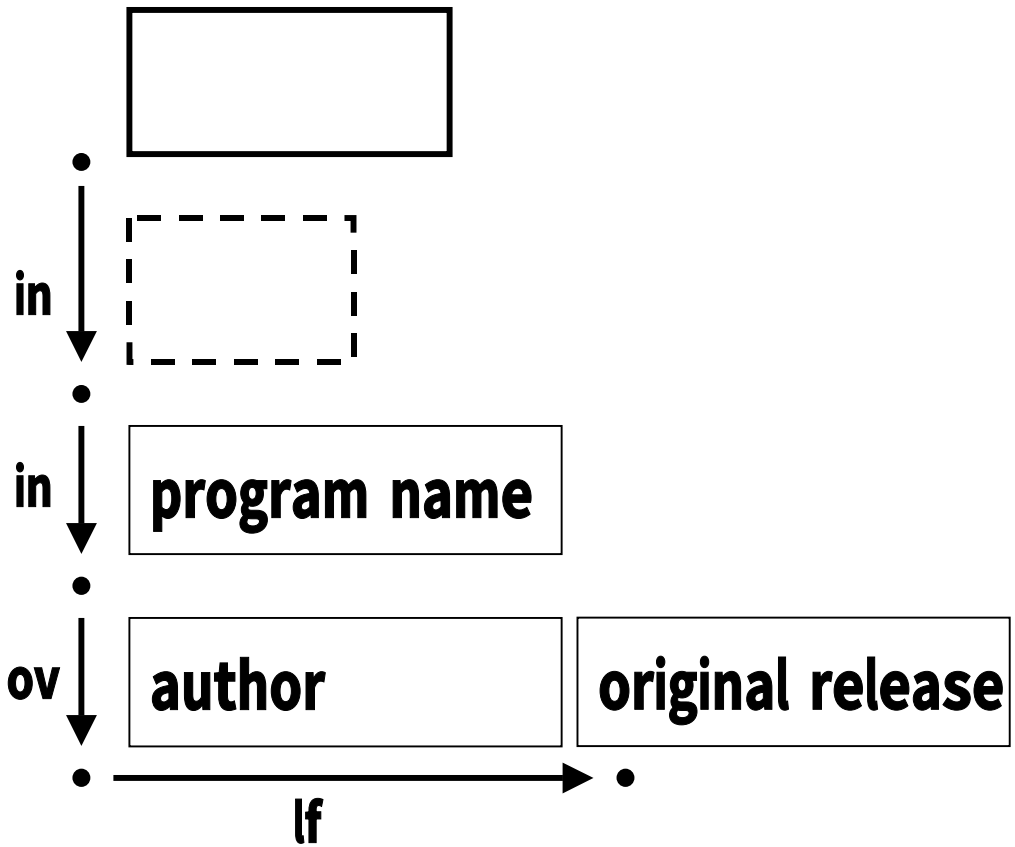
Tabular Forms and Marked Graph [Arita, 2000]

program name :	
author :	original release :

Tabular form



Nested Diagram



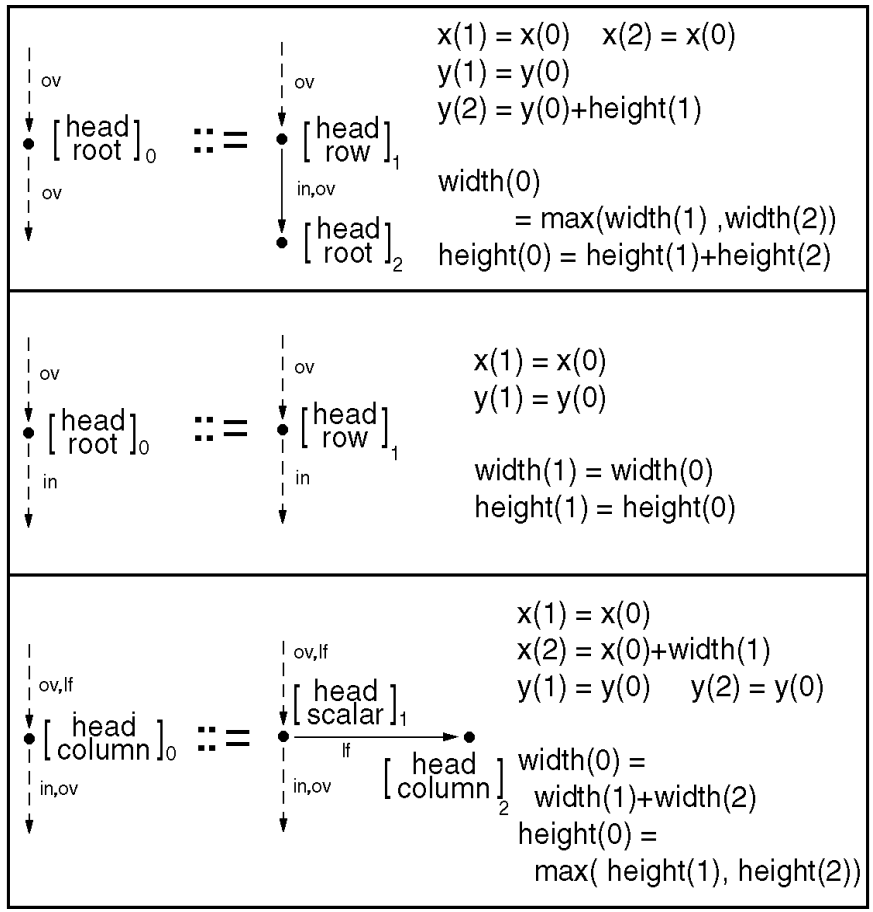
Marked Graph

2.2 Attribute edNCE Graph Grammar for Hiform [Arita, 2001]

HNGG = $<G_N, A_N, F_N>$ formulates Hiform

Underlying graph grammar $G_N = (\Sigma_N, \Delta_N, \Gamma_N, \Omega_N, P_N, S_N)$ (edNCE context-free graph grammar)

P_N : 280 Productions
A_N : The Attributes
F_N : 1248 Attribute rules



A Part of Productions in HNGG

2.3 Parsing Engine (Arita)

Input

Marked Graph with Attribute

MGC(Marked Graph Class)

Output

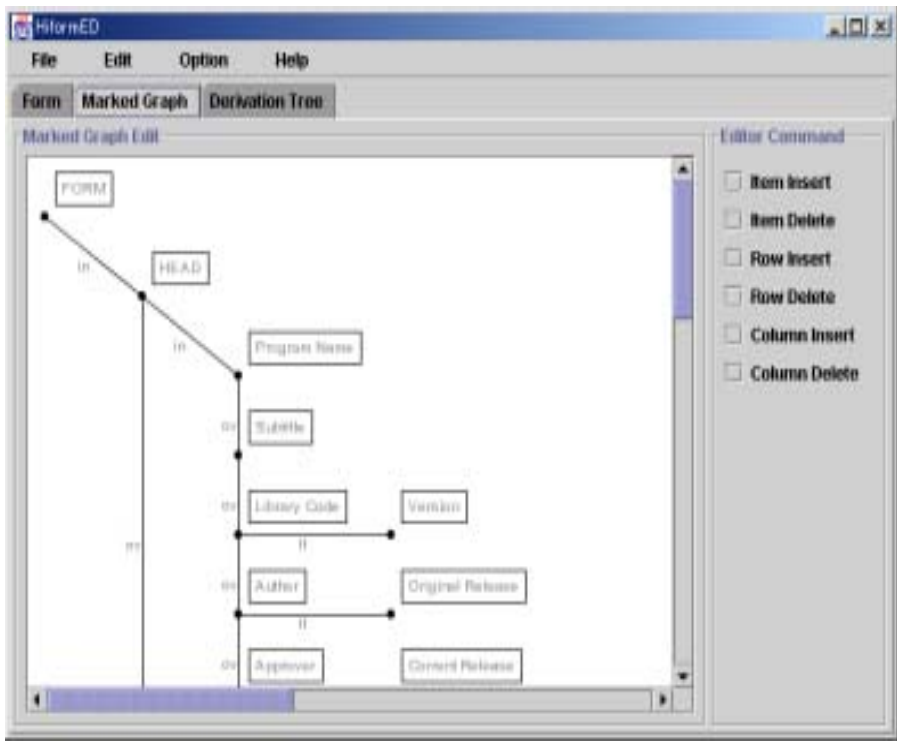
Attribute Derivation Tree

DTC(Derivation Tree Class)

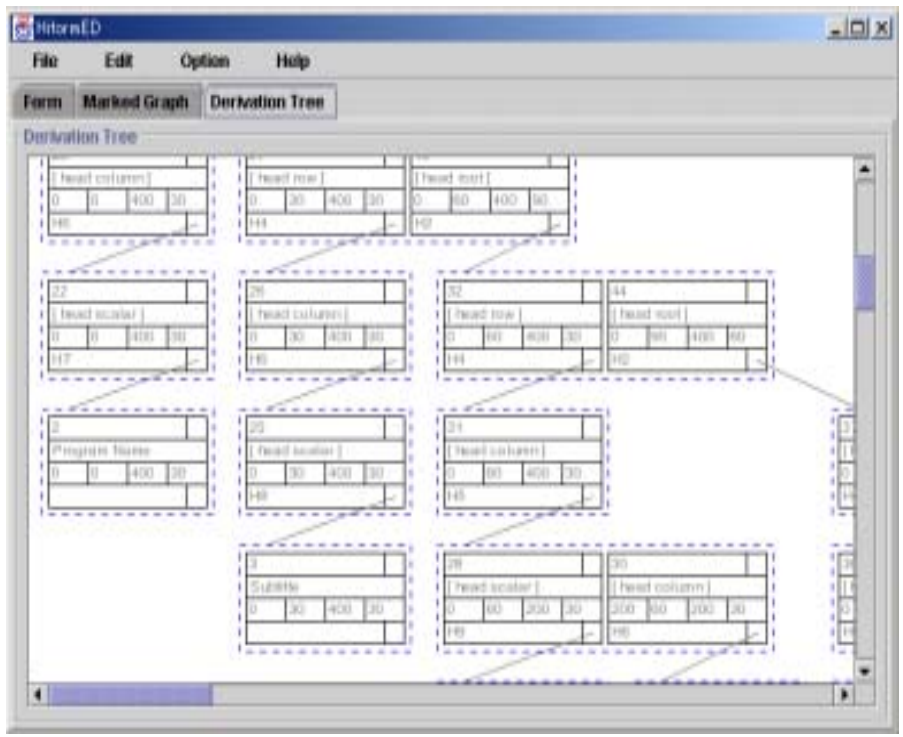
Method

- Syntax Analysis
- Attribute Evaluation

An Execution Screen of Parsing Engine (Arita 2001)

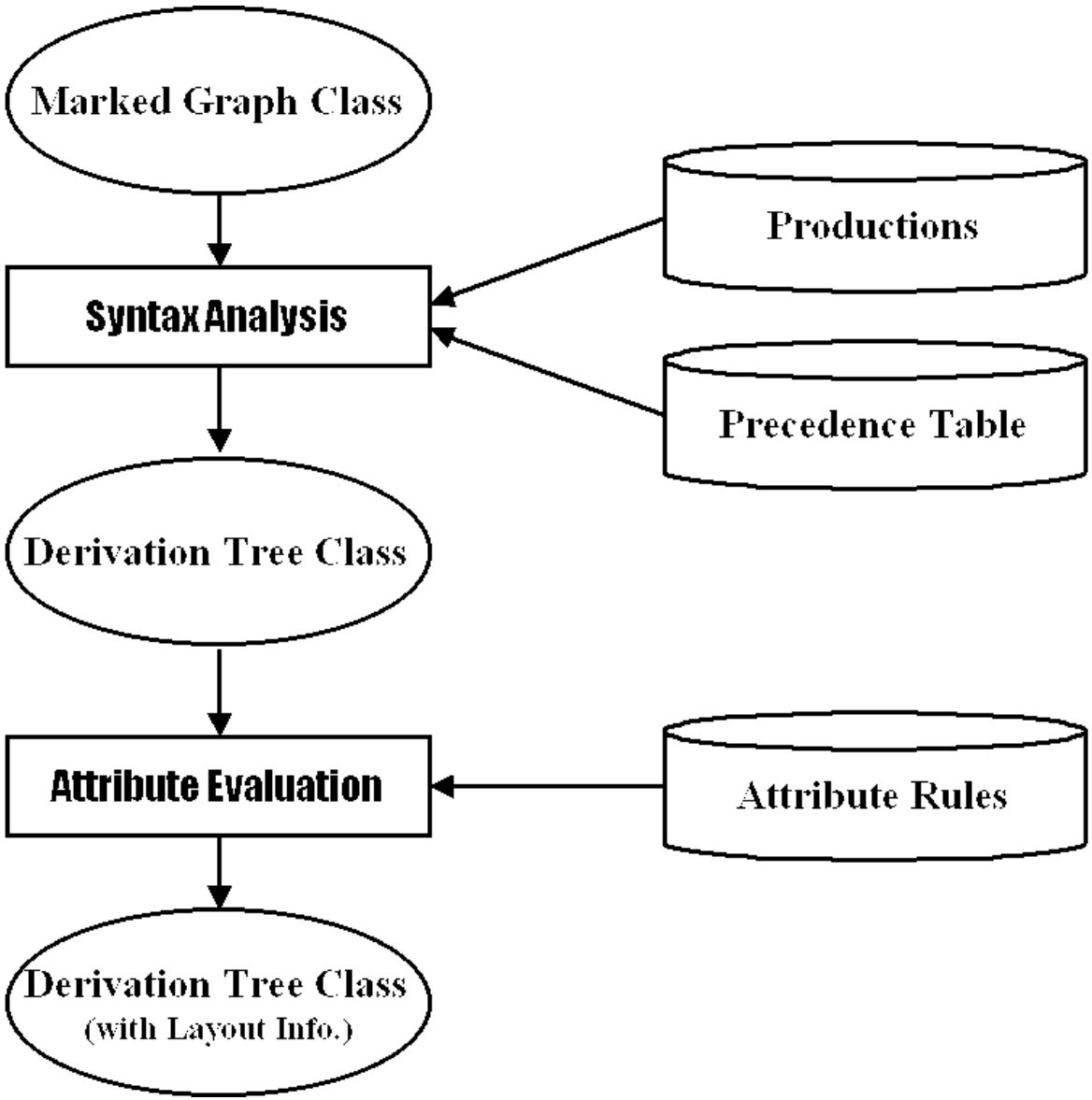


Input : Marked Graph



Output : Derivation Tree

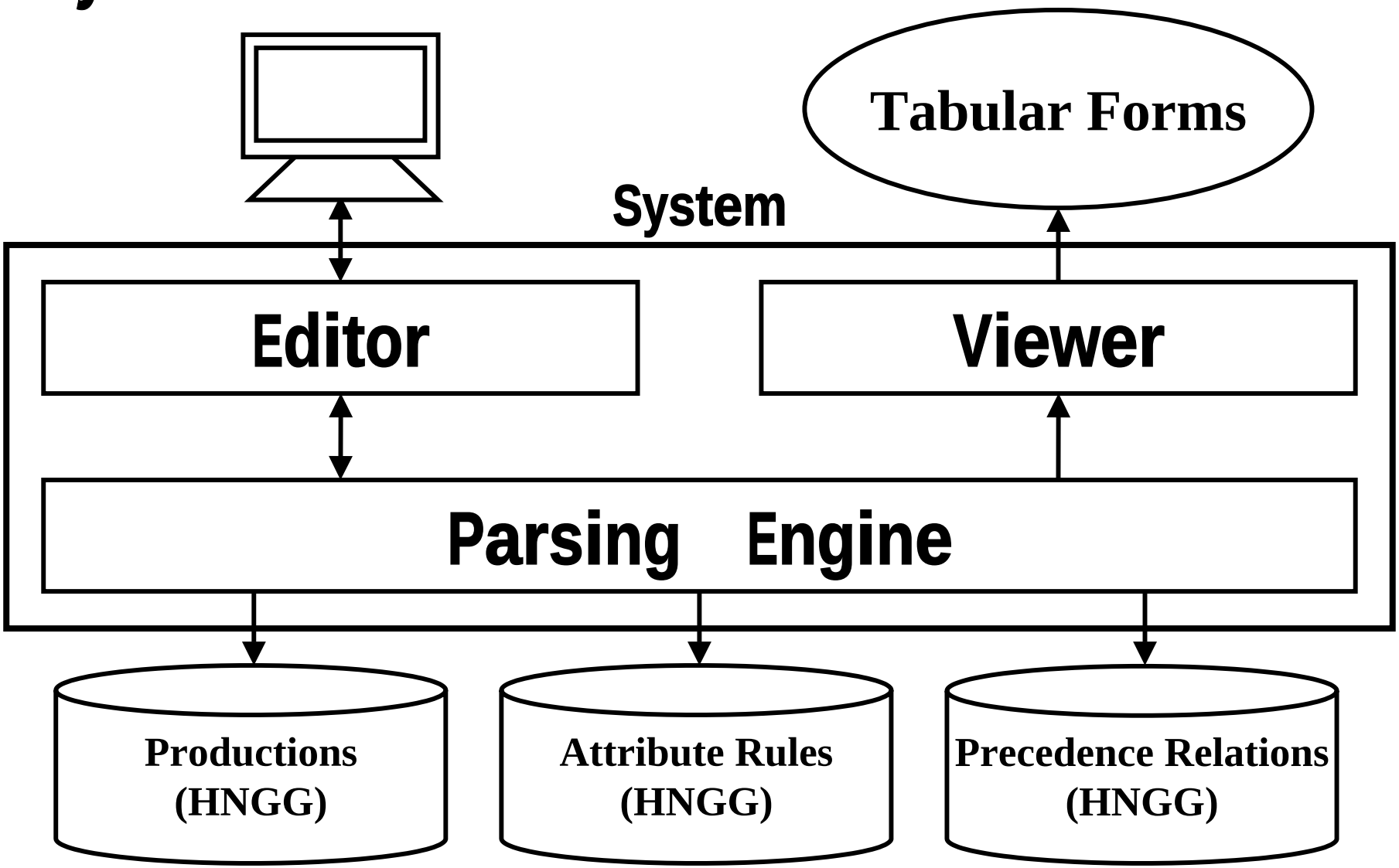
Parsing Process



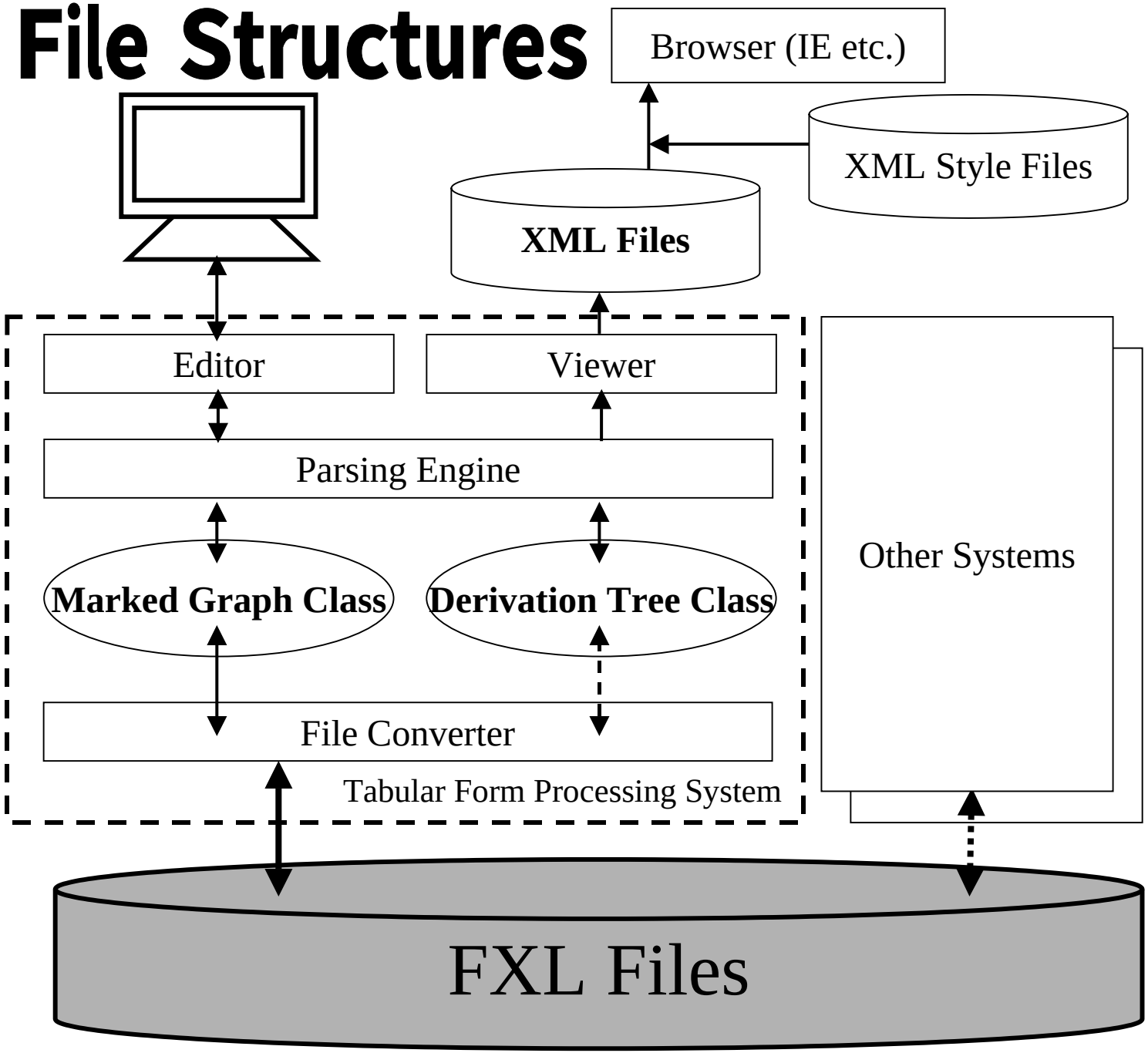
3. System Structure

3.1 System structure

System Overview



3.2 File Structures



3.3 MGC and DTC

MGC

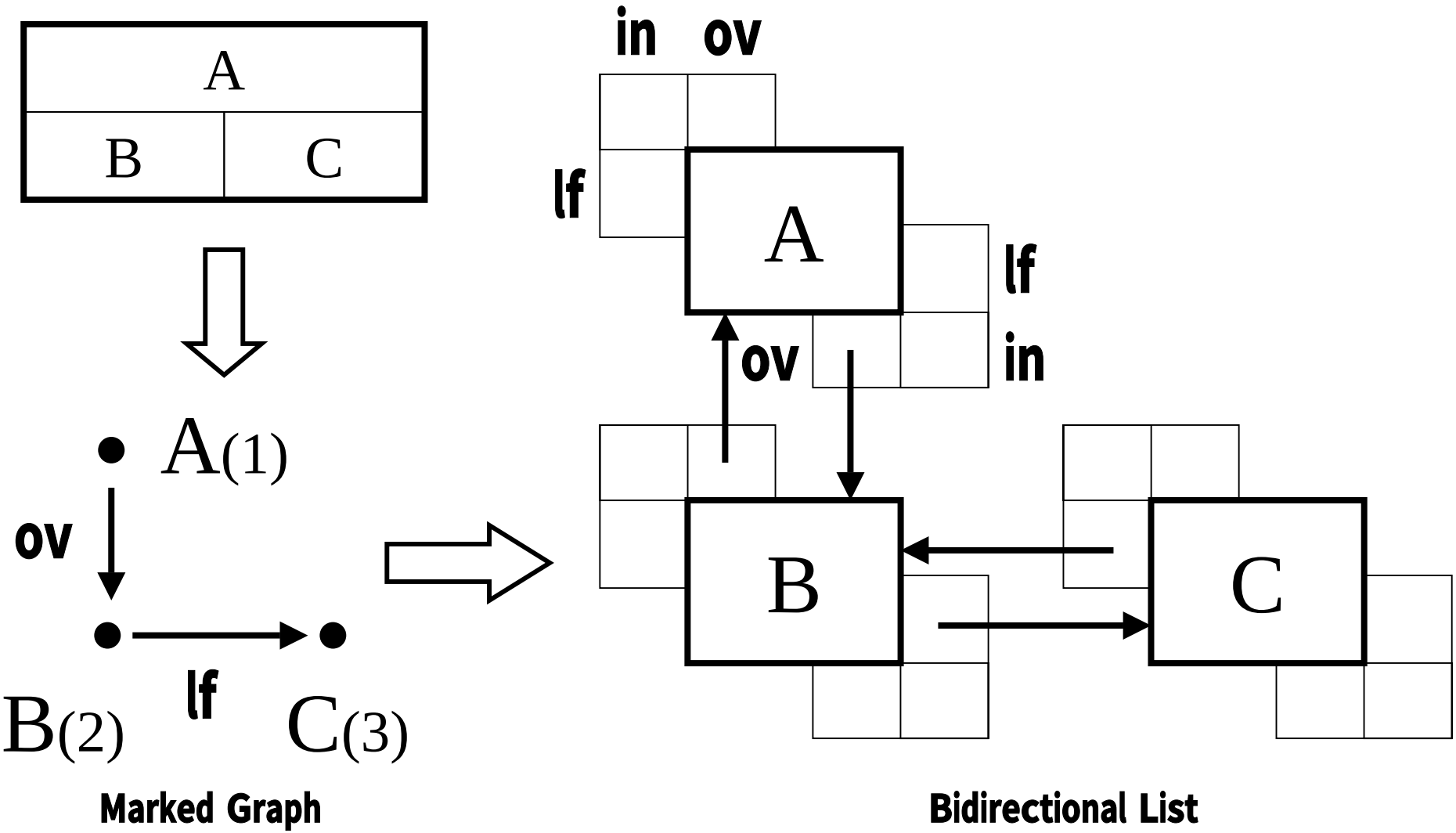
- Data structure of marked graph (edNCE GG)
- Java Class
- Bidirectional List
- Used for Syntax Analysis

3.3 MGC and DTC

DTC

- Data structure for derivation tree
- Java Class
- Bidirectional List
- Generated by Syntax Analysis
- Used for attribute evaluation and drawing of a table

3.4 The Data Structure of MGC



Viewer

Input

DTC(Derivation Tree Class) :

Output of Parsing Engine

Output

XML Files

Reference

Style File of XSL

Other modules omit.

4. Data Format of FXL

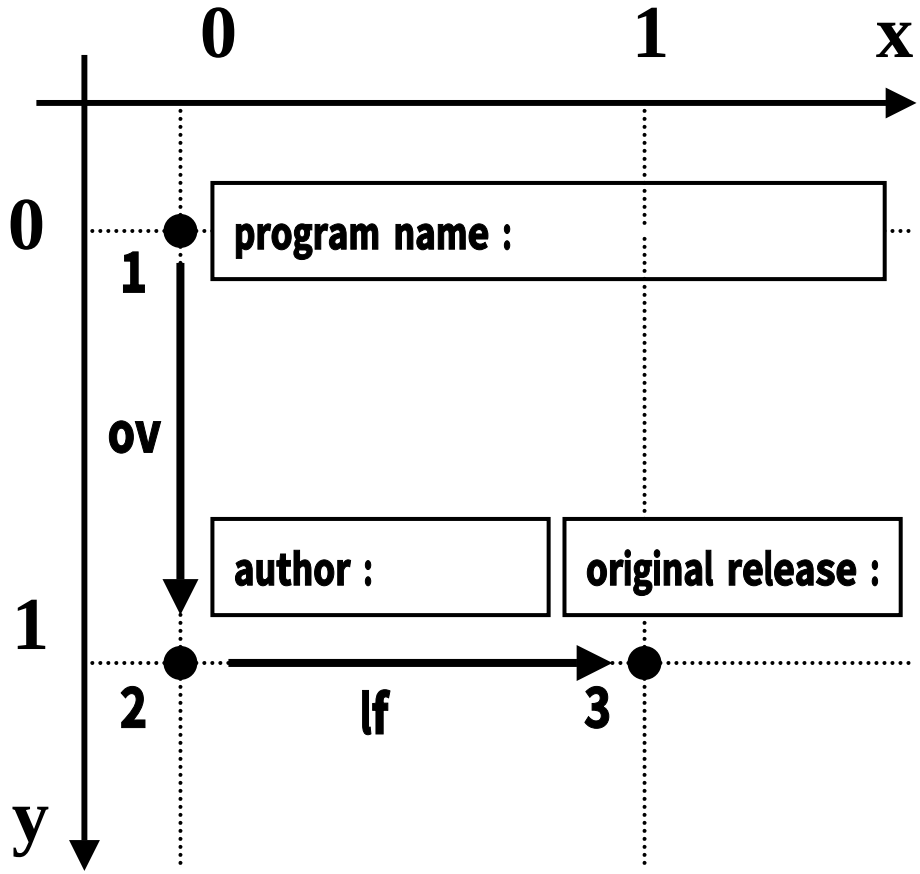
4.1 FXL(A Form Exchange Language)

- Syntax of FXL is defined by extended BNF.
- Codes of FXL are text-based codes.
- FXL can describe several attributes for tabular forms.

4.2 Description of a Graph Part

Whole Structure

```
graph{
    graphHeader{
    date{ 2002,1,1 }
    time{ 0,0,0 }
    }
   nodeSet{nodeObject{'''}
    nodeObject{'''}'''}
   edgeSet{edgeObject{'''}
    edgeObject{'''}''' }
}
```

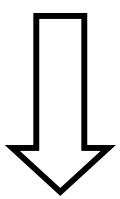


A Graph An Example for FXL Description

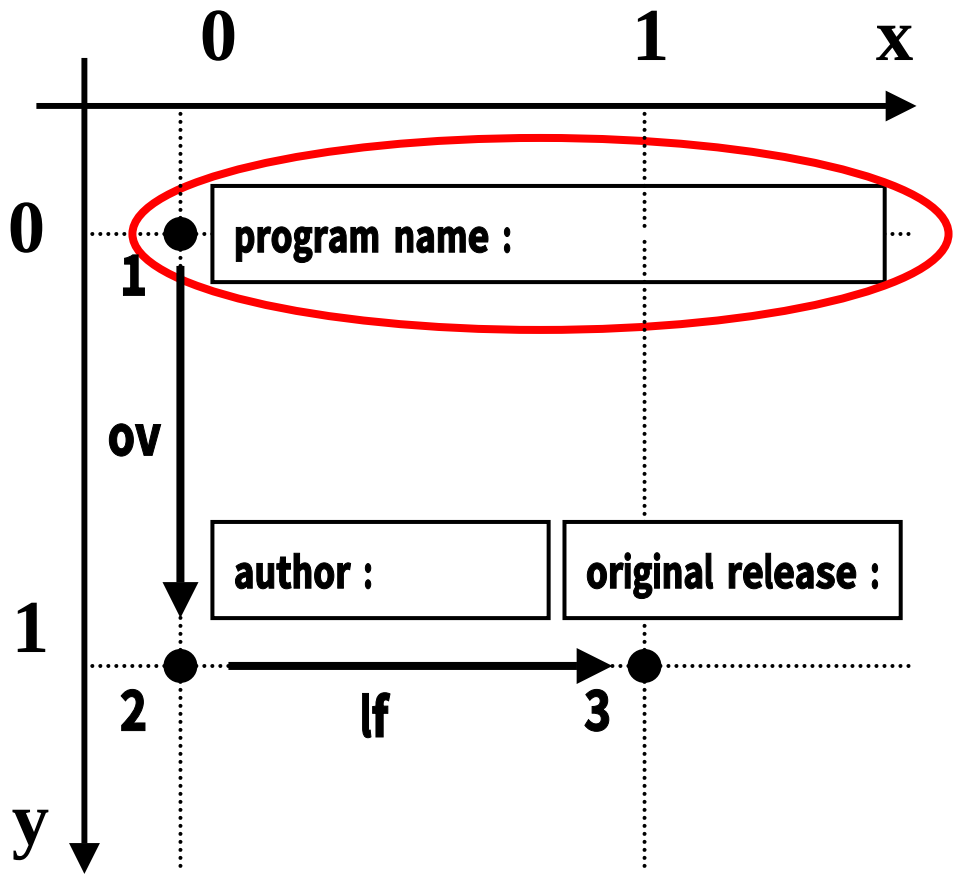
4.3 Description of a Node Part(1)

Description of Node 1

```
nodeObject{
    node{
      nodeID{ 1 }
      nodeX{ 0 }
      nodeY{ 0 }
    }
    nodeLabel{
      labelString{“program name”}
    }
```



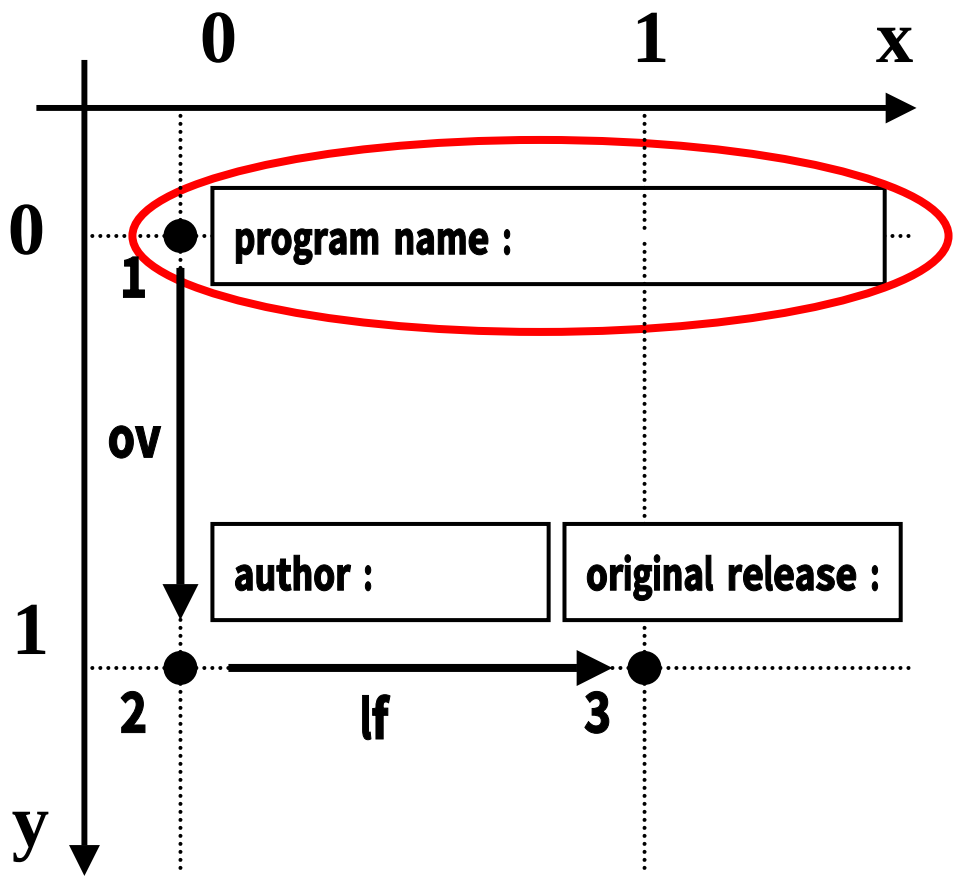
continued



A Graph An Example for FXL Description

4.3 Description of a Node Part(2)

```
attribute{
    cellSize{
      cellWidth{ 2 }
      cellHeight{ 1 }
    }
    cellLocation{
      cellX{ 0 }
      cellY{ 0 }
    }
  }
}
```

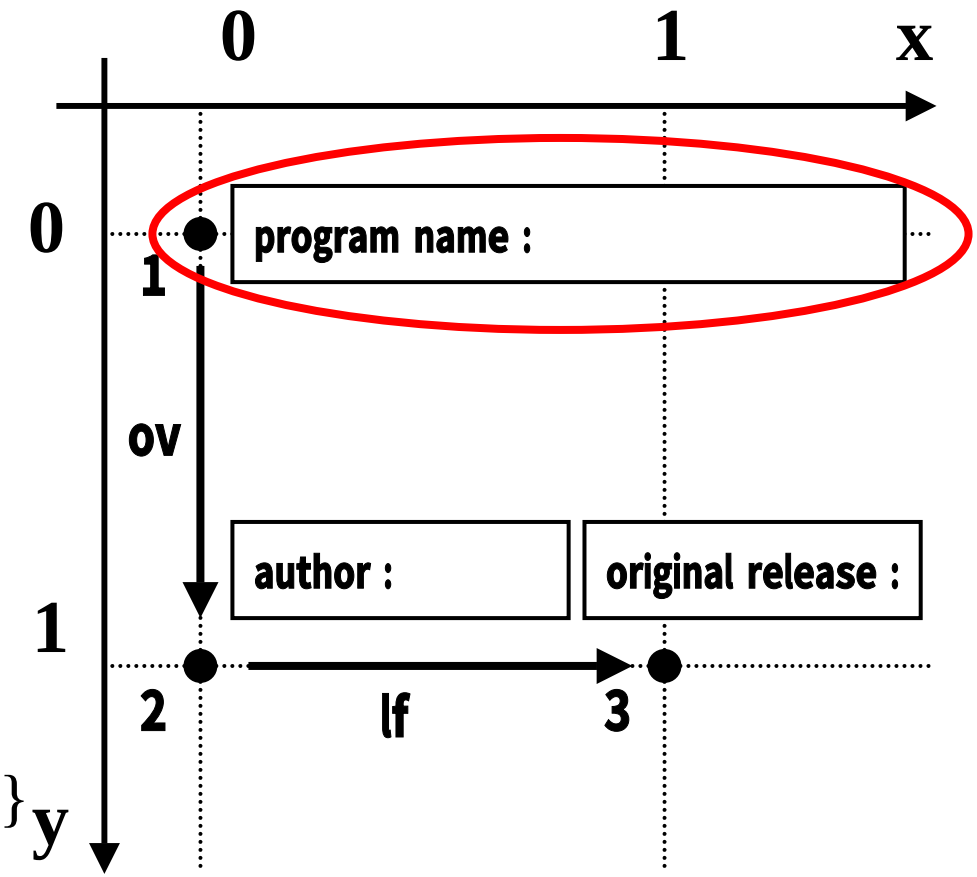


A Graph An Example for FXL Description

4.3 Description of a Node Part(3)

Node and Label Part

```
node{
   nodeID{ 1 }
   nodeX{ 0 }
   nodeY{ 0 }
}
nodeLabel{
   labelString{“program name”}
}
```

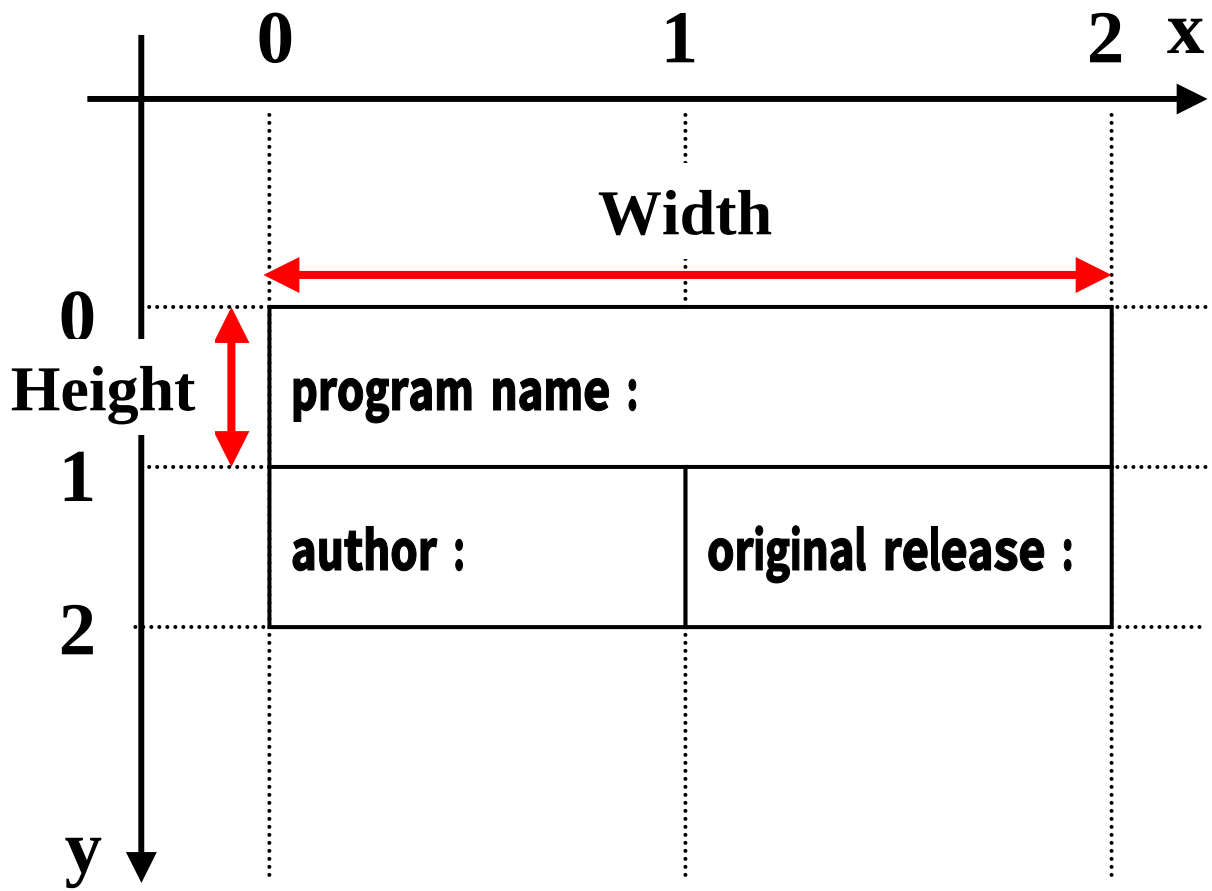


A Graph An Example for FXL Description

4.3 Description of a Node Part(4)

Attribute Part (Layout Information)

```
attribute{
    cellSize{
      cellWidth{ 2 }
      cellHeight{ 1 }
    }
    cellLocation{
      cellX{ 0 }
      cellY{ 0 }
    }
}
```

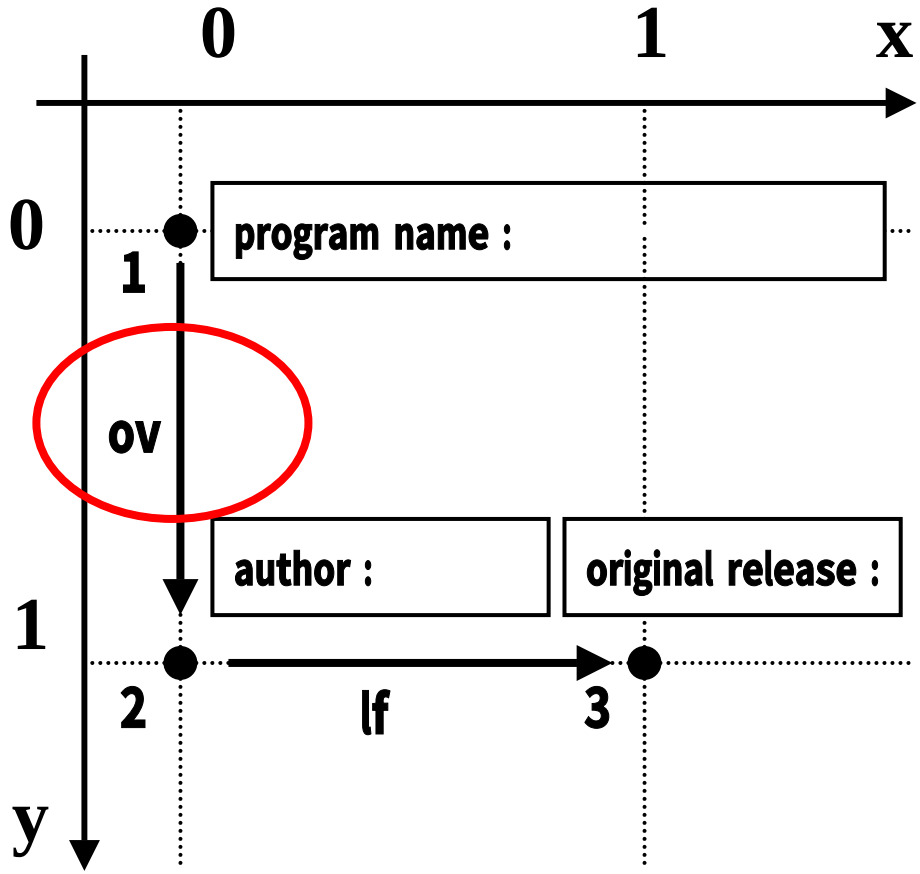


A Table of the FXL Description

4.4 Description of an Edge Part(1)

Description of Edge 1

```
edgeObject{
    edge{
      edgeID{ 1 }
      startNode{ 1 }
      endNode{ 2 }
      edgeShapes{“arrow”}
    }
    edgeLabel{
      labelString{“ov”}
    }
}
```

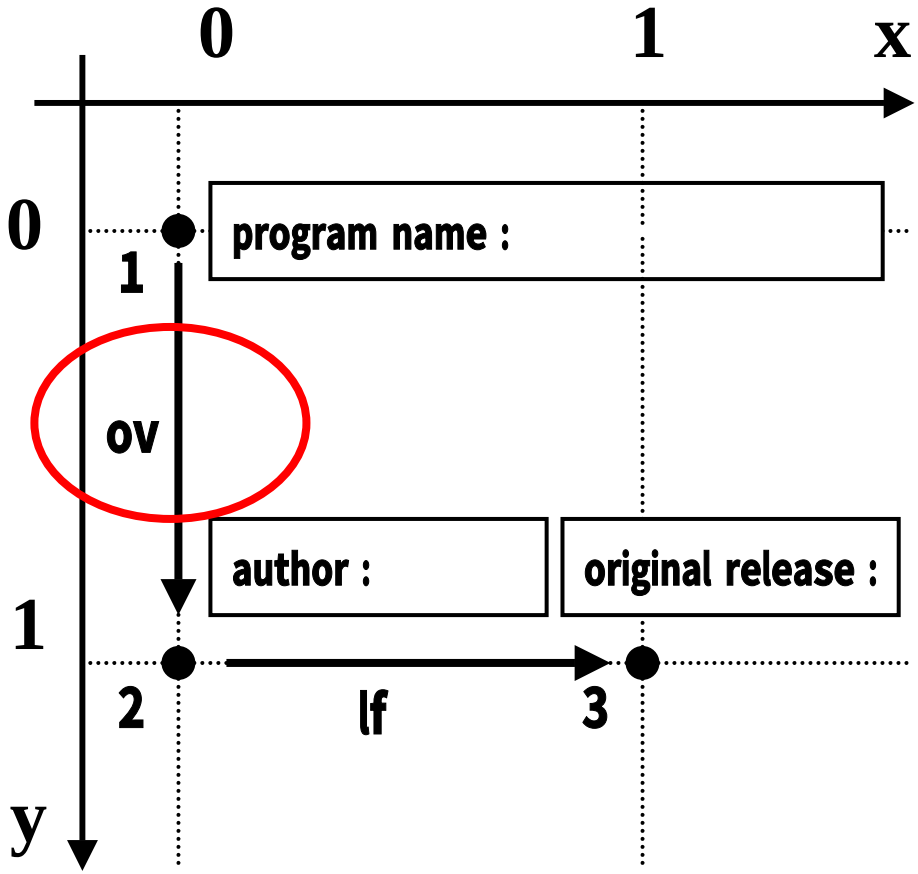


A Graph An Example for FXL Description

4.4 Description of an Edge Part(2)

Edge Part

```
edge{
  edgeID{ 1 }
  startNode{ 1 }
  endNode{ 2 }
  edgeShapes{“arrow”}
}
```

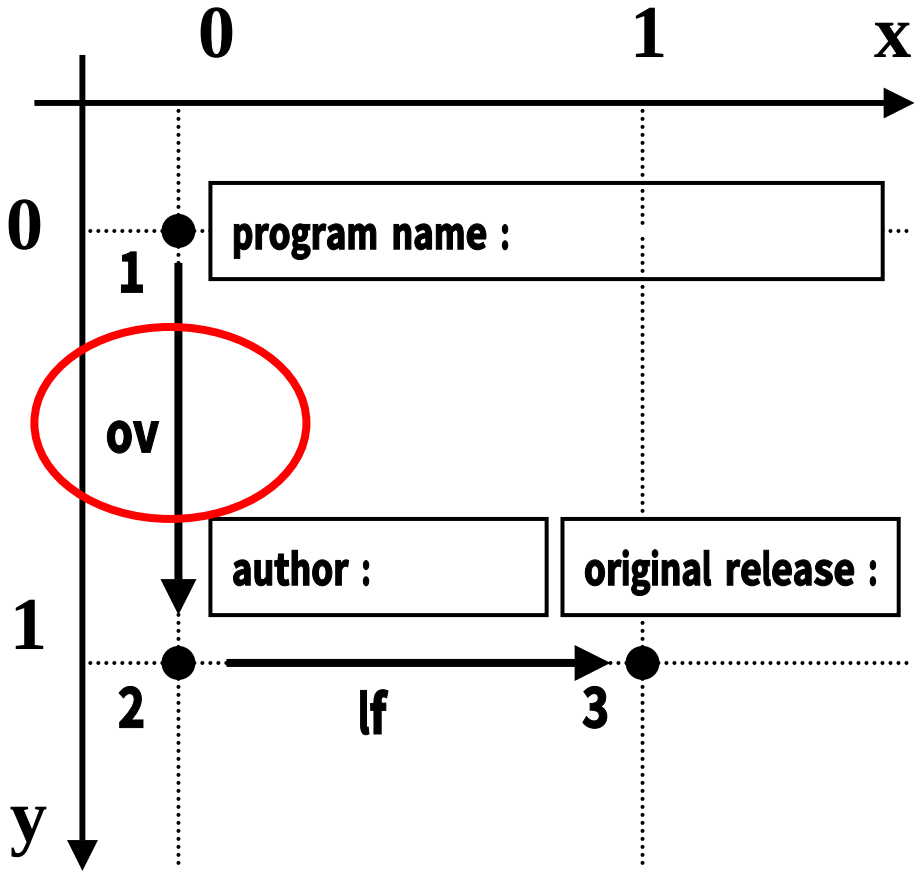


A Graph An Example for FXL Description

4.4 Description of an Edge Part(3)

Label Part

```
edgeLabel{
  labelString{“ov”}
}
```



A Graph An Example for FXL Description

BNF for FXL

A Part of Productions in FXL

node_id → "nodeID{" integer '}'
node_position → ε ¦ node_x node_y
node_x → "nodeX{" integer '}'
node_y → "nodeY{" integer '}'

attribute → "attribute{" attribute_inner '}'
attribute_inner → cell_size cell_location cell_color
cell_size → "cellSize{" cell_size_inner '}'
cell_size_inner → cell_width cell_height

Productions : 61 Rules

Remarks

Remark 1

Type of BNF-FXL is undecided.

Remark 2

The class of marked graphs described by FXL is proper super set of the one by HNGG.

5. Conclusion

5. Conclusion

- We made the system structure and the file structure of tabular form processing system based on graph grammar.

- We determine a data format FXL.

Future Works

- We are planning the development of parsing engine, editor, and viewer based on this data format FXL.

Available on the WWW

http://www.cssa.chs.nihon-u.ac.jp/~yaku/products.html