Mjølner System: Grammars

Mjølner Informatics Report

March 2004

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Beta Grammar

```
contractioncategories
   MainPart Attributes Imperatives
--- beta : aGrammar : metagrammar ---

Grammar beta :
```

Option

```
  version  = 9
  comBegin = '(*'
  comEnd   = '*)'
  stringChar = '\''
  splitString = true
  suffix = '.bet'
```

Rule

```
  <BetaForm>  ::| <DescriptorForm>
                | <AttributesForm>
                ;
  <DescriptorForm> ::= <ObjectDescriptor>
                     ;
  <AttributesForm> ::= <Attributes>
                     ;
  <ObjectDescriptor> ::= <PrefixOpt> <MainPart>
                       ;
  <MainPart> ::= '(#' <Attributes> <ActionPart> '#)'
               ;
  <Attributes> ::+ <AttributeDeclOpt> ';';

  <PrefixOpt> ::? <Prefix>;

  <Prefix> ::= <AttributeDenotation>;

  <AttributeDeclOpt>    ::? <AttributeDecl>;

  <AttributeDecl> ::| <PatternDecl>
                     | <SimpleDecl>
                     | <RepetitionDecl>
                     | <VirtualDecl>
                     | <BindingDecl>
                     | <FinalDecl>
                     | <ErrorDecl>
                     ;

  <PatternDecl> ::= <Names> ':' <ObjectDescriptor>;

  <SimpleDecl>  ::= <Names> ':' <referenceSpecification>;

  <RepetitionDecl>::= <Names> ':' '[' <index> ']' <referenceSpecification>;

  <VirtualDecl> ::= <Names> ':' '<' <ObjectSpecification>;

  <BindingDecl> ::= <Names> ':' ':' '<' <ObjectSpecification>;

  <FinalDecl> ::= <Names> ':' ':' <ObjectSpecification>;

  <VariablePattern> ::=  '##' <AttributeDenotation>;
```

```
<referenceSpecification> ::| <StaticItem>
                           | <DynamicItem>
                           | <StaticComponent>
                           | <DynamicComponent>
                           | <VariablePattern>
                           ;

<StaticItem> ::= '@' <ObjectSpecification>;

<DynamicItem> ::= '^' <AttributeDenotation>;

<StaticComponent> ::= '@' '|' <ObjectSpecification>;

<DynamicComponent> ::= '^' '|' <AttributeDenotation>;

<ObjectSpecification> ::| <ObjectDescriptor>
                       | <AttributeDenotation>
                       ;

<Index> ::| <SimpleIndex>
          | <NamedIndex>
          ;

<NamedIndex>  ::= <NameDcl> ':' <Evaluation>;

<ActionPart>  ::= <EnterPartOpt> <DoPartOpt> <ExitPartOpt>;

<EnterPartOpt> ::? <EnterPart>;
<DoPartOpt> ::? <DoPart>;
<ExitPartOpt> ::? <ExitPart>;

<EnterPart>   ::= 'enter' <Evaluation>;
<DoPart>      ::= 'do' <Imperatives>;
<ExitPart>    ::= 'exit' <Evaluation>;

<Imperatives> ::+ <ImpOpt> ';' ;
<ImpOpt>      ::? <Imp>;

<Imp> ::| <LabelledImp>
        | <ForImp>
        | <SimpleIfImp>
        | <GeneralIfImp>
        | <LeaveImp>
        | <RestartImp>
        | <InnerImp>
        | <SuspendImp>
        | <Evaluation>
        | <CodeImp>
        | <errorImp>;

<LabelledImp> ::= <NameDcl> ':' <Imp>;

<ForImp> ::= '(' 'for' <Index> 'repeat' <Imperatives> 'for' ')';

<GeneralIfImp> ::= '(' 'if' <Evaluation> <Alternatives> <ElsePartOpt> 'if' ')';

<SimpleIfImp> ::= '(' 'if' <Evaluation> 'then' <Imperatives> <ElsePartOpt> 'if' ')';

<LeaveImp> ::= 'leave' <NameApl>;

<RestartImp>  ::= 'restart' <NameApl>;

<InnerImp>    ::= 'inner' <NameAplOpt>;

<NameAplOpt> ::? <NameApl> ;
```

```
<SuspendImp>  ::= 'suspend' ;

<CodeImp>     ::= '(' 'code' <CodeItems> 'code' ')';

<Alternatives> ::+ <Alternative> ;
<Alternative> ::= <Selections> 'then' <Imperatives>;

<Selections>::+ <Selection> ;
<Selection> ::| <CaseSelection> ;

<CaseSelection> ::= '//' <evaluation>;

<ElsePartOpt>  ::? <ElsePart>;
<ElsePart>    ::= 'else' <Imperatives>;

<Evaluations> ::+ <Evaluation> ',';

<Evaluation>  ::| <Expression>
                | <AssignmentEvaluation>;

<AssignmentEvaluation> ::= <Evaluation> '->' <Transaction>;

<Transaction> ::| <ObjectEvaluation>
                | <ComputedObjectEvaluation>
                | <ObjectReference>
                | <EvalList>
                | <StructureReference>
                | <Primitive>
                | <Address>
                ;
<ObjectEvaluation> ::| <InsertedItem>
                     | <reference>
                     ;
<Reference> ::| <ObjectDenotation>
              | <DynamicObjectGeneration>
              ;
<DynamicObjectGeneration> ::| <DynamicItemGeneration>
                            | <DynamicComponentGeneration>
                            ;
<InsertedItem> ::= <ObjectDescriptor> ;
<ObjectDenotation> ::= <AttributeDenotation> ;
<ComputedObjectEvaluation> ::= <ObjectEvaluation> '!' ;
<ObjectReference> ::= <Reference> '[]';
<StructureReference> ::= <AttributeDenotation> '##' ;
<EvalList>    ::= '(' <Evaluations> ')';
<DynamicItemGeneration> ::= '&' <ObjectSpecification>;
<DynamicComponentGeneration> ::= '&' '|' <ObjectSpecification>;
<Primitive>   ::= 'tos' <SimpleEntry>;
<Address>     ::= '@@'  <AttributeDenotation>;

<AttributeDenotation>::| <NameApl>
                       | <Remote>
                       | <ComputedRemote>
                       | <Indexed>
                       | <ThisObject>
                       | <RemotePrimitive>
                       ;
<Remote> ::= <AttributeDenotation> '.' <NameApl>;
<ComputedRemote> ::= '(' <Evaluations> ')' '.' <NameApl> ;
<Indexed> ::= <AttributeDenotation> '[' <Evaluation> ']';
<ThisObject> ::= 'this' '(' <NameApl> ')' ;
<RemotePrimitive> ::= <AttributeDenotation> '.%' <NameApl>;

<Expression>  ::| <RelationalExp> | <SimpleExp> ;
```

```
<RelationalExp>::| <EqExp> | <LtExp> | <LeExp>
                 | <GtExp> | <GeExp> | <NeExp>
                 ;

<SimpleExp>   ::| <AddExp> | <SignedTerm> | <Term> ;

<AddExp>      ::| <PlusExp> | <MinusExp> | <OrExp> | <XorExp>;

<SignedTerm> ::| <unaryPlusExp> | <unaryMinusexp>;

<Term>        ::| <MulExp> | <Factor> ;

<MulExp>      ::| <TimesExp> | <RealDivExp> | <IntDivExp>
                | <ModExp> | <AndExp> | <PrimitiveExp> ;

<EqExp> ::= <Operand1:SimpleExp> '=' <Operand2:SimpleExp>;
<LtExp> ::= <Operand1:SimpleExp> '<' <Operand2:SimpleExp>;
<LeExp> ::= <Operand1:SimpleExp> '<=' <Operand2:SimpleExp>;
<GtExp> ::= <Operand1:SimpleExp> '>' <Operand2:SimpleExp>;
<GeExp> ::= <Operand1:SimpleExp> '>=' <Operand2:SimpleExp>;
<NeExp> ::= <Operand1:SimpleExp> '<>' <Operand2:SimpleExp>;

<PlusExp>     ::= <SimpleExp> '+' <Term>;
<MinusExp>    ::= <SimpleExp> '-' <Term>;
<OrExp>       ::= <SimpleExp> 'or' <Term>;
<XorExp>       ::= <SimpleExp> 'xor' <Term>;

<unaryPlusExp> ::= '+' <Term>;
<unaryMinusExp> ::= '-' <Term>;

<TimesExp>    ::= <Term> '*' <Factor>;
<RealDivExp>  ::= <Term> '/' <Factor>;
<IntDivExp>   ::= <Term> 'div' <Factor>;
<ModExp>      ::= <Term> 'mod' <Factor>;
<AndExp>      ::= <Term> 'and' <Factor>;

<PrimitiveExp> ::= <Term> '%' <NameApl> <Factor> ;

<Factor>      ::| <TextConst>
                | <IntegerConst>
                | <NotExp>
                | <NoneExp>
                | <RepetitionSlice>
                | <Transaction>
                | <UnaryPrimitiveExp>
                ;

<RepetitionSlice> ::= <AttributeDenotation>
                      '[' <Low:Evaluation> ':' <High:Evaluation> ']' ;
<notExp>      ::= 'not' <factor>;
<noneExp>     ::= 'none';
<UnaryPrimitiveExp> ::= '%' <NameApl> <factor>;

<Names> ::+ <NameDcl> ',';
<NameDcl> ::= <NameDecl>;
<NameApl> ::= <NameAppl>;

<SimpleEntry> ::? <TextConst>;
<TextConst>   ::= <String>;
<IntegerConst> ::= <Const>;

<SimpleIndex> ::= <Evaluation>;

<CodeItems> ::+ <CodeItem> ',';
<CodeItem>    ::| <CodeString> | <CodeConst>;
<CodeString>  ::= <String>;
```

```
  <CodeConst>   ::= <Const>;

(* now for the errorproductions *)
  <ErrorDecl>   ::= Error;
  <ErrorImp>    ::= Error
```

Attribute

```
<ObjectSpecification> : 0
<Attributes> : 0

<DescriptorForm> : 18
<AttributesForm> : 18
<ObjectDescriptor> : 8
<MainPart> : 2
<DoPart> : 2
<ForImp> : 2
<repetitionDecl> : 2
<LabelledImp> : 2
<nameDcl> : 2
<nameApl> : 4
<bindingDecl> : 2
<FinalDecl> : 2
<InsertedItem> : 2
<ObjectDenotation> : 2
<ComputedObjectEvaluation> : 2
<RepetitionSlice>:2
<ObjectReference> : 2
<EvalList> : 2
<Address> : 2
<Primitive> : 2
<DynamicItemGeneration> : 2
<DynamicComponentGeneration> : 2

<EqExp> : 2
<LtExp> : 2
<LeExp> : 2
<GtExp> : 2
<GeExp> : 2
<NeExp> : 2
<PlusExp>  : 2
<MinusExp>  : 2
<OrExp> : 2
<XorExp> : 2
<MulExp>  : 2
<TimesExp>  : 2
<RealDivExp>  : 2
<IntDivExp>  : 2
<ModExp>  : 2
<AndExp> : 2

<EnterPart> : 2
<ExitPart> : 2


<DescriptorForm>:
(# descNo: integer;
   Xorigin: AST;
   sysAtt: integer
#)
<AttributesForm>:
(# Xorigin: AST;
```

```
   descNo: integer;
   dclRoot: NameDcl;
   lib: AST;
   kind: integer
#)
<ObjectDescriptor>:
(# descNo: integer;
   origin: AST;
   size: integer;
   attSize: integer;
   mark: int16u;
   kind: int8u;
   type: int8u;
   dclRoot: NameDcl;
   lib: AST;
   returnOff: integer;
   originOff: integer
#)
<MainPart>:
(# descNo: integer;
   xorigin: AST
#)
<RepetitionDecl>:
(# origin: AST
#)
<EnterPart>:
(# NXOff: integer;
   NXSize: integer
#)
<DoPart>:
(# xorigin: AST;
   descNo: integer
#)
<ExitPart>:
(# NXOff: integer;
   NXSize: integer
#)
<LabelledImp>:
(# origin: AST
#)
<ForImp>:
(# off: integer;
   origin: AST
#)
<InsertedItem>:
(# insOff: integer
#)
<ObjectDenotation>:
(# evalkind: integer
#)
<Expression>:
(# eval1: integer;
   eval2: integer
#)
<RepetitionSlice>:
(# evalKind: integer
#)
<nameDcl>:
(# left: NameDcl;
   right: NameDcl;
   access: integer;
   off: integer;
   virtDcl: AST;
   restartAdr: integer;
   leaveAdr: integer
#)
```

```
<nameApl>:
(# on: integer;
   pn: integer;
   dclRef: NameDcl;
   onForThis: integer;
   descRef: AST;
   origin: AST
#)
```

Index

The entries in the alphabetic index consists of all left−sides in the grammar.
The small table of letters below links directly to the section of identifiers starting with the corresponding letters.

A

B

C

D

E

F

G

I

L

<LabelledImp<LeaveImp <LeExp<LtExp

M

<MainPart<MinusExp <ModExp<MulExp

N

<NameApl<NameAplOpt<NamedDcl <NamedIndex<Names<NeExp <noneExp<notExp

O

<ObjectDenotation<ObjectDescription <ObjectEvaluation<ObjectReference <ObjectSpecification<OrExp

P

<PatternDecl<PlusExp <Prefix<PrefixOpt <Primitive<PrimitiveExp

R

<RealDivExp<Reference<referenceSpecification <RepetitionDecl<RepetitionSlice<Restart

S

<Selection<Selections<SignedTerm <SimpleDecl<SimpleExp<SimpleStatic <StaticItem<Structure

T

<Term<TextConst <ThisObject<TimesExp <Transaction

U

<unaryMinusExp <unaryPlusExp <UnaryPrimitiveExp

V

<VariablePattern <VirtualDecl

X

<XorExp

Metagrammar Grammar

```
--- metagrammar : Agrammar : metagrammar ---
Grammar metagrammar :
```

Option

```
  version    = 5
  suffix= '.gram'

  BobsOption = '32,34'
  comBegin   = '(*'
  comEnd     = '*)'
  stringChar = '\''
```

Rule

```
  <AGrammar>    ::= 'Grammar' <GrammarName> ':' <OptionOp>
                    'Rule' <ProductionList> <AttributeOp>;
  <GrammarName> ::= <NameDecl>;
  <ProductionList>::+ <Prod> ';';

  <Prod>        ::|<Alternation>|<Constructor>|<Lst>
                  |<Opt>|<Dummy>|<ErrorProd>;

  <LeftSide>    ::= '<' <SynDeclName> '>';

  <Alternation> ::= <LeftSide> '::|' <SynCatList>;
  <SynCatList>  ::+ <SynCat> '|';

  <Constructor> ::= <LeftSide> '::=' <ConsElemList>;
  <ConsElemList>::+ <ConsElem>;
  <ConsElem>    ::| <TaggedSyn> | <SynCat> | <Term> | <ErrorSpec>;
  <TaggedSyn>   ::= '<' <TagName> ':' <SynName> '>';
  <SynCat>      ::= '<' <SynName> '>';
  <ErrorSpec>   ::= 'error';

  <Lst>         ::| <ListOne> | <ListZero>;
  <ListOne>     ::= <LeftSide> '::+' <SynCat> <TermOp>;
  <ListZero>    ::= <LeftSide> '::*' <SynCat> <TermOp>;
  <TermOp>      ::? <Term>;

  <Opt>         ::= <LeftSide> '::?' <SynCat>;

  <Dummy>       ::= <LeftSide> '::'  <SynCat>;

  <SynName>     ::= <NameAppl>;
  <TagName>     ::= <NameDecl>;
  <SynDeclName> ::= <NameDecl>;
  <Term>        ::= <String>;

  <OptionOp>    ::? <OptionPart>;
  <OptionPart>  ::= 'option' <optionList>;
  <optionList>  ::+ <optionElement>;
  <optionElement> ::= <optionName> '=' <optionSpecification>;
  <optionSpecification> ::| <singleOption> | <optionSpecLst>;
  <optionSpecLst>   ::= '(' <optionSpecList> ')';
  <optionSpecList>  ::+ <singleOption>;

  <singleOption>::| <optionName> | <optionConst>
                  | <optionString> | <optionError>;
```

```
<optionName>  ::= <NameAppl>;
<optionConst> ::= <Const>;
<optionString>::= <String>;

<AttributeOp> ::? <AttributePart>;
<AttributePart>::= 'attribute' <attriblist>;
<AttribList>  ::* <Attrib>;

<Attrib>      ::| <SimpleAttrib>
                | <ComplexAttrib> ;

<SimpleAttrib> ::= <SynCat> ':' <NoOfAttributes>;
<ComplexAttrib> ::= <SynCat> ':' '(#' <DeclList> '#)';
<DeclList>      ::+ <Decl> ';' ;
<Decl> ::= <DeclName> ':' <ApplName> ;
<DeclName> ::= <NameDecl> ;
<ApplName> ::= <NameAppl> ;
<NoOfAttributes> ::= <const>;
<errorProd> ::= Error;
<optionError> ::= Error
```

Attribute

```
<LeftSide> : 2
<SynName>  : 1

<Decl>     : 0
<Prod>     : 0
<ConsElem> : 0
<AGrammar> : 0
<TaggedSyn>: 0
<SynCat>   : 0
<Term>     : 0
```

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A

C

D

<Decl<DeclList <DeclName<Dummy

E

<errorProd <ErrorSpec

G

<GrammarName

L

<LeftSide<ListOne <ListZero<Lst

N

<NoOfAttributes

O

<Opt<optionConst<optionElement<optionList<optionName<OptionSpecification<optionSpecList<opt

P

<Prod <ProductionList

S

<SimpleAttrib<singleOption <SynCat<SynCatList <SynDeclName<SynName

T

<TaggedSyn<TagName <Term<TermOp

Prettyprint Grammar

```
-- prettyprint : Agrammar : metagrammar --
Grammar prettyprint:
```

option

```
suffix='.pgram'
bobsoptions = '25, 32, 34'
combegin    = '(*'
comEnd      = '*)'
stringChar  = '\''
```

rule

```
<PrettyPrint>   ::= 'PrettyPrintScheme' <SchemeName:nameDecl>
                    'for' <GrammarName:nameDecl> ':' <ProductionList>;
<ProductionList>::* <Production> ';' ;

<Production>    ::| <Constructor> | <ListProd> ;
<Constructor>   ::= <ProductionName:nameAppl> '=' <Stream:ItemList>;
<ListProd>      ::= <ProductionName:nameAppl> '=' '(' <ListSpec> ')';

<ItemList>      ::* <Item>;
<Item>          ::| <Terminal> | <NonTerm> | <Break> | <Block>
                  | <CommentPlace>;

<Terminal>      ::| <DefaultTerm> | <AltTerm> ;
<DefaultTerm>   ::= 'T' ':' <TerminalNo:const>;
<AltTerm>       ::= <AlternativeTerminal:String> ;

<NonTerm>       ::= 'N' ':' <NonTerminalNo:const>;

<Break>         ::| <DefaultBreak> | <AltBreak> ;
<DefaultBreak>  ::= '$$';
<AltBreak>      ::= '$' <Space:const> ',' <Indention:const>;

<Block>         ::= '[' <BlockType> <ItemList> ']';

(* comments must only be specified after terminals! *)
<CommentPlace>  ::= '*';

<ListSpec>      ::= <Beginning:ItemList>
                    '{' <BlockType> <Separator:ItemList> '}'
                   <Ending:ItemLIst> ;

<BlockType>     ::| <Consistent> | <InConsistent> ;
<Consistent>    ::= 'c';
<InConsistent>  ::= 'i'
```

Attribute

```
<Constructor> : 1
<ListProd>    : 1
<DefaultTerm> : 2
<AltTerm>     : 2
<NonTerm>     : 2
```

```
<ListSpec>    : 2
```

Index

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Property Grammar

```
-- property : aGrammar : metagrammar ---

Grammar property :
```

Option

```
  version  = 4
  comBegin = '(*'
  comEnd   = '*)'
  splitOnFiles = 1
  stringChar = '\''
  suffix = '.prop'
```

Rule

```
  <Properties> ::= <PropertyList> ;

  <PropertyList> ::+ <PropertyOpt> ';' ;

  <PropertyOpt> ::? <Property> ;

  <Property>  ::| <ORIGIN>
                | <INCLUDE>
                | <BODY>
                | <MDBODY>
                | <OBJFILE>
                | <LIBFILE>
                | <LINKOPT>
                | <BETARUN>
                | <BUILD>
                | <MAKE>
                | <RESOURCE>
                | <LIBDEF>
                | <LIBITEM>
                | <ON>
                | <OFF>
                | <Other>;

  <ORIGIN> ::= 'ORIGIN' <TextConst> ;

  <INCLUDE> ::= 'INCLUDE' <StringList> ;

  <BODY> ::= 'BODY' <StringList> ;

  <MDBODY> ::= 'MDBODY' <MachineSpecificationList> ;

  <OBJFILE> ::= 'OBJFILE' <MachineSpecificationList> ;

  <LIBFILE> ::= 'LIBFILE' <MachineSpecificationList> ;

  <LINKOPT> ::= 'LINKOPT' <MachineSpecificationList> ;

  <BETARUN> ::= 'BETARUN' <MachineSpecificationList> ;

  <MAKE> ::= 'MAKE' <MachineSpecificationList> ;

  <BUILD> ::= 'BUILD' <MachineSpecificationList> ;
```

```
<RESOURCE> ::= 'RESOURCE' <MachineSpecificationList> ;

(*<LIBDEF> ::= 'LIB_DEF' <Name:TextConst> <Location:TextConst>;
  this gives qua error in sif (setsyncatno) *)

<LIBDEF> ::= 'LIB_DEF' <StringList>;

<LIBITEM> ::= 'LIB_ITEM' <Name:TextConst>;

<ON> ::= 'ON' <IntegerList>;

<OFF>  ::= 'OFF' <IntegerList>;

<StringList>::* <TextConst> ;

<IntegerList>::+ <IntegerConst> ;

<MachineSpecificationList>::+ <MachineSpecification>;

<MachineSpecification> ::= <Machine> <StringList>;

<Machine> ::| <NameApl> | <Default> ;

<Default> ::= 'default' ;

<Other> ::= <NameDcl> <PropertyValueList> ;

<PropertyValueList> ::* <PropertyValue> ;

<PropertyValue> ::= <Value> ;

<Value> ::| <NameDcl> | <IntegerConst> | <TextConst> ;

<NameDcl> ::= <NameDecl>;

<NameApl> ::= <NameAppl>;

<TextConst>   ::= <String>;

<IntegerConst> ::= <Const>
```

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B

D

I

L

M

N

O

P

R

S

T

V