User
- name: String

CutBuffer
- content : Gamma
+ copy(content : Gamma): void
+ cut(content : Gamma): void
+ paste(): Gamma

MemoryFile
- users: List<User>
- spreadsheets: List<SpreadSheet>

Position
- x : int
- y : int
+ hashCode(): int

Gamma
- cells : List<Cell>

Cell
- content: CellType
- value: Literal
- position: Position
+ getContentName(): String
+ computeContentValue(): Void

Reference
- cell: Cell
+ computeValue(): Literal

IntLiteral
- value: int
+ computeValue(): Literal

StringLiteral
- value: String
+ computeValue(): Literal

<<interface>>
CellType
+ computeValue(): Literal

<>
Lit&Ref

<>
Literal

<>
IntFunctions
- args: Gamma

<>
BinFunctions
- arg1: Lit&Ref
- arg2: Lit&Ref

Average
+ computeValue(): Literal

Product
+ computeValue(): Literal

Concat
+ computeValue(): Literal

Coalesce
+ computeValue(): Literal

Sub
+ computeValue(): Literal

Add
+ computeValue(): Literal

Mul
+ computeValue(): Literal

Div
+ computeValue(): Literal

SpreadSheet
- cellMap: Map<Position, Cell>
- CutBuffer: CutBuffer
- author: User
+ insertContents (rangeSpecification: String, contentSpecification: String
+ copy(): void
+ cut(): void
+ delete(): void
+ insert(): void
+ paste(): void
+ show(): void
+ showCutBuffer(): void
+ showFunctions(): void
+ showValues(): void

ConvertInput
+ convertPosition (position: String): List<Position>
+ convertType(content: String): CellType
- verifyString (): boolean
- verifyInt(): boolean
- verifyRef(): boolean
- verifyFunction(): boolean

```
Calculator
────────────────────────
-  memoryFile : MemoryFile
-- spreadsheet : SpreadSheet
-  user : User
-
────────────────────────
+ save () : void
+ SaveAs() : void
+ load () : void
+ importFile () : void
+ new (height : int, width : int) : void
```

XXL-core

- Converte Input
- Cut Buffer — -content
- Gamma
  - -cells
- Position
- Calculator — -spread sheet → Spread -cellMAP → * Cell — -content
  - -user
  - -author
  - -value
- «interface» CellType
- Spread → * Cell
- User — *
- «abstract» Lit & Ref
- Import File exception ←
  - Missing File Association Exception
  - Unavaible file exception
  - Unrecognized Entry Exception
- -users ◇ Memory file
  - -memory file
  - -arg1
  - -arg2
- -spreadsheets
- «abstract» Bin Functions
  - -args
  - Add
  - Sub
  - Mul
  - Div
- «abstract» Int Functions
  - -args
  - Average
  - Product
  - Concat
  - Coalesce
- -cell Reference
- «abstract» Literal
  - Int Literal
  - String Literal

xxl exceptions
- Exceptions

Serializable

(Spread, Cell, Gamma, Position, CellTypes, User também implementam serializable)