HASKELL-declarations

$\underline{\text{decl}}$	$\rightarrow$	$\underline{\text{typedecl}} \mid \underline{\text{fundecl}}$
$\underline{\text{typedecl}}$	$\rightarrow$	$\underline{\text{var}}_1, \ldots, \underline{\text{var}}_n \; :: \; \underline{\text{type}}, \quad n \geq 1$
$\underline{\text{var}}$	$\rightarrow$	string starting with lower case symbol
$\underline{\text{fundecl}}$	$\rightarrow$	$\underline{\text{funlhs}}\ \underline{\text{rhs}}$
$\underline{\text{funlhs}}$	$\rightarrow$	$\underline{\text{var}}\ \underline{\text{pat}}$
$\underline{\text{rhs}}$	$\rightarrow$	$= \; \underline{\text{exp}}$

Evaluation in HASKELL

$$\begin{tikzcd}
 & \texttt{square (12 - 1)} \arrow[dl] \arrow[dr] & & \\
\texttt{square 11} \arrow[ddr] & & \texttt{(12 - 1) * (12 - 1)} \arrow[dl] \arrow[dr] & \\
 & \texttt{11 * (12 - 1)} \arrow[d] & & \texttt{(12 - 1) * 11} \arrow[dll] \\
 & \texttt{11 * 11} \arrow[d] & & \\
 & \texttt{121} & &
\end{tikzcd}$$

Conditional Equations and Tuples

```
maxi(x, y) | x >= y      = x
           | otherwise   = y
```

Currying

```
plus :: (Int, Int) -> Int
plus (x, y) = x + y
```

$$\Downarrow$$

```
plus :: Int -> Int -> Int
plus x y = x + y
```

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$\underline{\mathsf{decl}}$	$\rightarrow$	$\underline{\mathsf{typedecl}} \mid \underline{\mathsf{fundecl}}$
$\underline{\mathsf{typedecl}}$	$\rightarrow$	$\underline{\mathsf{var}}_1, \ldots, \underline{\mathsf{var}}_n \; :: \; \underline{\mathsf{type}}, \quad n \geq 1$
$\underline{\mathsf{var}}$	$\rightarrow$	string starting with lower case symbol
$\underline{\mathsf{fundecl}}$	$\rightarrow$	$\underline{\mathsf{funlhs}}\ \underline{\mathsf{rhs}}$
$\underline{\mathsf{funlhs}}$	$\rightarrow$	$\underline{\mathsf{var}}\ \underline{\mathsf{pat}}_1 \ \ldots \underline{\mathsf{pat}}_n, \quad n \geq 1$
$\underline{\mathsf{rhs}}$	$\rightarrow$	$= \ \underline{\mathsf{exp}} \mid \underline{\mathsf{condrhs}}_1 \ \ldots \ \underline{\mathsf{condrhs}}_n, \quad n \geq 1$
$\underline{\mathsf{condrhs}}$	$\rightarrow$	$\mid \underline{\mathsf{exp}} \ = \ \underline{\mathsf{exp}}$

Pattern Declarations

```
pin :: Float
pin = 3.14159

suc :: Int -> Int
suc = plus 1

x0, y0 :: Int
(x0, y0) = (1,2)

x1, y1 :: Int
[x1,y1] = [1,2]

x2 :: Int
y2 :: [Int]
x2:y2 = [1,2]
```

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$\underline{\text{decl}}$	$\rightarrow$	$\underline{\text{typedecl}} \mid \underline{\text{fundecl}} \mid \underline{\text{patdecl}}$
$\underline{\text{typedecl}}$	$\rightarrow$	$\underline{\text{var}}_1, \ldots, \underline{\text{var}}_n :: \underline{\text{type}}, \quad n \geq 1$
$\underline{\text{var}}$	$\rightarrow$	string starting with lower case symbol
$\underline{\text{fundecl}}$	$\rightarrow$	$\underline{\text{funlhs}}\ \underline{\text{rhs}}\ [\texttt{where}\ \underline{\text{decls}}]$
$\underline{\text{funlhs}}$	$\rightarrow$	$\underline{\text{var}}\ \underline{\text{pat}}_1 \ \ldots \underline{\text{pat}}_n, \quad n \geq 1$
$\underline{\text{rhs}}$	$\rightarrow$	$= \ \underline{\text{exp}} \mid \underline{\text{condrhs}}_1 \ \ldots \ \underline{\text{condrhs}}_n, \quad n \geq 1$
$\underline{\text{condrhs}}$	$\rightarrow$	$\mid \underline{\text{exp}} \ = \ \underline{\text{exp}}$
$\underline{\text{patdecl}}$	$\rightarrow$	$\underline{\text{pat}}\ \underline{\text{rhs}}\ [\texttt{where}\ \underline{\text{decls}}]$
$\underline{\text{decls}}$	$\rightarrow$	$\{\ \underline{\text{decl}}_1; \ldots ; \underline{\text{decl}}_n\ \}, \quad n \geq 0$

HASKELL-**declarations (2)**

$$\underline{\textsf{decl}} \quad\rightarrow\quad \underline{\textsf{typedecl}} \mid \underline{\textsf{fundecl}} \mid \underline{\textsf{patdecl}} \mid \underline{\textsf{infixdecl}}$$

$$\underline{\textsf{infixdecl}} \quad\rightarrow\quad \left\{\begin{array}{c}\texttt{infix}\\ \texttt{infixl}\\ \texttt{infixr}\end{array}\right\} \left[\left\{\begin{array}{c}\texttt{0}\\ \texttt{1}\\ \vdots\\ \texttt{9}\end{array}\right\}\right] \underline{\textsf{op}}_1\texttt{,}\ldots\texttt{,}\underline{\textsf{op}}_n, \qquad n \geq 1$$

$$\underline{\textsf{op}} \quad\rightarrow\quad \underline{\textsf{varop}} \mid \underline{\textsf{constrop}}$$

$\underline{\textsf{varop}} \quad\rightarrow$ string of special symbols, not starting with :

$\underline{\textsf{constrop}} \quad\rightarrow$ string of special symbols starting with :