Brief Introduction to HKtex (Version 2.04)
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1st October, 2014
(Notice: This brief introduction is taken from Version 2.00. Updated introduction will be released afterward.)

1. Introduction HKtex is a formula parsing software written for mobile phones and tablets using Android operating system. It is developed using Google Eclipse and thus allows app developers and book writers to import the files easily. There is now a clear distinction between books and apps. It is difficult to add interactive elements into books written with Tex/Latex and, in creating apps, there is no comprehensive formula parsing software easily imported by Eclipse. The purpose of HKtex is to remove this distinction. HKtex will, intentionally and eventually, enable developers to create apps which are also complete books by themselves, and writers to write books which contain interactive examples, exercises and graphics. In writing HKtex, I understood the popularity of Tex/Latex and thus make HKtex as compatible to Tex/Latex as possible. However, some differences exist. I will try to explain them in this document. Before moving to next section, I wish to emphasize that this is an ongoing endeavor and is by no means a completed work. However, I feel that it is presentable and thus release it to solicit feedback to make it better.

2. Program structure HKtex is written with java. Since there are many situations to consider, this program is inherently difficult. Avoid changing the files, except the four input files: MainActivity.java, Header.java, Source.java, and Symbol.java.

   The content of the document is stored in Content.java. The content is broken up into blocks. Your document can be contained inside one huge block or many small blocks. Breaking up into smaller blocks allow you to parse a particular block. Each block begins with begin[blockline] and ends with end[blockline]. The begin[blockline] command can be omitted but the end[blockline] command must be there. Besides you can not begin an environment, e.g. equation, in one block and end the environment in another block. The Header.java file contains page layout informations, for example, margin, gap width between lines, etc. You can have more than one Header.java file and use different one in different situation. The Symbol.java file contains symbols. Comment out those symbols that are not used for the purpose of efficiency.

3. Environment There are seven different environments in HKtex:
text, eqnarray, equation, table, verbatim, graphics and graphicstable. By
default, the environment is text and no further specification is needed. To
close a different environment within text, use the begin and end
commands. For example, the following lines:

\begin{eqnarray}
y &= \int_0^1 2x \,dx \\
&= x^2 - x^2
\end{eqnarray}

will give:

\[ y = \int_0^1 2x \,dx \\
= x^2 - x^2 \]

Inside eqnarray, equation and table environments, the lines are
automatically centered. HKtex does not provide other alignment.
However, for text environments, the following alignment are possible:

- left-aligned text
- centered text
- right-aligned text

HKtex does not hyphenate the center-aligned or right-aligned text.

To change the font size, type \Huge, \huge, \Large, \large,
\normalsize, \small, \scriptsize or \tiny at the beginning of line, as in the
following:

\Huge text
\huge text
\Large text
\large text
\normalsize text
\small text
\scriptsize text
\tiny text

The default font size is defined in header.java. It cannot be bigger
than the maximum size, also specified in header.java. However, since the
maximum can be adjusted. The size is in fact not bounded.

The font type can be specified by the command \tt, \bf, \rm, \ttu, \bfu, \rmu,
also at the beginning of the line. They stand for \tt, \bf, \rm, \ttu, \bfu, \rmu
mono. The next one is New, used for typing symbol. The last one is \tmu
used only for trigonometric, logarithmic and hyperbolic functions. Do
not specify the last two.

\ttt text
\ttf text
\ttn text

4. Table

The command for constructing a table is similar to Tex/LaTeX.
However, the table in HKtex is more primitive. It does not provide table
within table. The following is a simple example:

**Table 1. Infinite products of hyperbolic functions**

<table>
<thead>
<tr>
<th>Hyperbolic functions</th>
<th>Infinite Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sinh z$</td>
<td>$\prod_{k=1}^{\infty} \left( 1 + \frac{z^2}{k^2 \pi^2} \right)$</td>
</tr>
<tr>
<td>$\cosh z$</td>
<td>$\prod_{k=1}^{\infty} \left[ 1 + \frac{4k^2}{(2k+1)^2 \pi^2} \right]$</td>
</tr>
</tbody>
</table>

Using tabular within table is allowed, as demonstrated in the following example:

<table>
<thead>
<tr>
<th>Laplace's equations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cartesian Coordinates</strong></td>
<td></td>
</tr>
<tr>
<td>$\frac{d^2 u}{dx^2} + \frac{d^2 u}{dy^2} = 0$</td>
<td></td>
</tr>
<tr>
<td>$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$</td>
<td></td>
</tr>
<tr>
<td><strong>Polar Coordinates</strong></td>
<td></td>
</tr>
<tr>
<td>$\frac{\partial^2 (r u)}{\partial r^2} + \frac{1}{r} \frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial \theta^2} = 0$</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Laplace's equations**

Note that there is also no tabular within tabular.

HKtex does not have fbox, this can be compensated somewhat by using table and draw only the lines on the outer boundaries. For example:

The Jacobian of a transformation is:

$$
\begin{vmatrix}
\frac{\partial x}{\partial u} & \frac{\partial x}{\partial v} \\
\frac{\partial y}{\partial u} & \frac{\partial y}{\partial v}
\end{vmatrix}
$$

Inside table, the default is symbol mode. If text mode is needed, enclosed it within a mbox.

5. **Eqnarray and equation** Equation array is like table except that the row is right by default. Besides, neither vertical line nor horizontal line will be drawn. Equation is an eqnarray with just one line. You can specify an equation just like an eqnarray. This is allowed in HKtex. The following provides a few examples of equation and eqnarray.

Lagrange's Expansion Formula:
\[ x - x_0 \sum_{k=1}^{\infty} \frac{\varepsilon_{x_0} y_k}{k!} \left\{ x_k \left( g'(x_k) \left\{ \frac{x-x_0}{x-x_0} \right\} \right) \right\}_{n=0} \]

Continued fraction:

\[ f = b_0 + \frac{a_1}{b_1 + \frac{a_2}{b_2 + \frac{a_3}{b_3 + \frac{\ddots}{\ddots}}}} \]

(arbitrary pagebreak here :)

4
Algebraic equation:

\[ y = \begin{cases} 
0 & x = 1 \\
\frac{\ln|x|}{\sqrt[3]{|x|}} & x \neq 1 
\end{cases} \]

Fluid equations:

\[ \nabla \cdot \mathbf{U} = 0 \quad \text{(continuity)} \]

\[ \frac{\partial \mathbf{U}}{\partial t} + \nabla \cdot (\rho \mathbf{U} \mathbf{U}) = -\nabla p + \nabla \cdot \mathbf{T} \quad \text{(momentum)} \]

6. **Graphics and Graphicstable** Figures can be included within the \begin{center} and \end{center} commands.

\begin{center}
\textbf{Figure 1. The left arrow.}
\end{center}

If there are more than one figures, then the \begin{center} and \end{center} commands can be used.

\begin{center}
\textbf{Figure 2. The left arrow, the right arrow, the left end arrow and the right end arrow.}
\end{center}

7. **Color** Color can only be specified within each environment (except \verb|egin{verbatim}|). The following table is a list of color predefined in HKtx. You can easily add another color by adding another entry in the Color.java file. The name should not be the same as any other command name. For example the color tan is missing because it has the same name as the trigonometric function tan.

If table pass beyond the bottom of the view container, it will be move to the next one. However, if the scrollview in Header.java is specified as true, the table will not be moved.

8. **Math Symbols** There are over one thousand symbols in HKtx corresponding to the amsmath font with four unicode digits. Besides, common trigonometric, logarithmic, hyperbolic functions and limit are regarded as symbol. They are classified in different types for the purpose of putting the superscript and subscript. Not every symbol has superscript nor subscript. For example, if you assign a superscript to underbrace, the program will stop parsing and an error message will be shown. Refer to Symbol.java for the available symbols. For optimization, uncomment any symbol that is needed, and comment out any symbol that is not needed.

9. **Final Comment** HKtx is very much an ongoing endeavour. A
### Table 3. Color table

<table>
<thead>
<tr>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
<th>Color Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>blueviolet</td>
<td>cadmiumorange</td>
<td>cadmiumyellow</td>
<td>carrot</td>
<td>black</td>
<td>burrenocche</td>
<td>darkwood</td>
</tr>
<tr>
<td>chocolate</td>
<td>cobalt</td>
<td>cobaltgreen</td>
<td>coldgrey</td>
<td>cornflowerblue</td>
<td>cranberry</td>
<td>brick</td>
</tr>
<tr>
<td>crimson</td>
<td>cran</td>
<td>darkgoldenrod</td>
<td>darkgray</td>
<td>darkgreen</td>
<td>darkred</td>
<td>brown</td>
</tr>
<tr>
<td>maroon</td>
<td>burntmauve</td>
<td>chartreuse</td>
<td>coral</td>
<td>darkolivegreen</td>
<td>darkorange</td>
<td>burntorange</td>
</tr>
<tr>
<td>darkorchid</td>
<td>darksalmon</td>
<td>darkseagreen</td>
<td>darkslateblue</td>
<td>darkslategray</td>
<td>darkturquoise</td>
<td>dusky</td>
</tr>
<tr>
<td>dddarkviolet</td>
<td>deeppink</td>
<td>deepskyblue</td>
<td>dimgray</td>
<td>dodgerblue</td>
<td>skyblue</td>
<td>electricblue</td>
</tr>
<tr>
<td>emeraldgreen</td>
<td>firebrick</td>
<td>flesh</td>
<td>forestgreen</td>
<td>gamboge</td>
<td>golden</td>
<td>gold</td>
</tr>
<tr>
<td>gold</td>
<td>goldenrod</td>
<td>gray</td>
<td>green</td>
<td>greenyellow</td>
<td>greenblack</td>
<td>greenblack</td>
</tr>
<tr>
<td>marigold</td>
<td>indigo</td>
<td>indigo</td>
<td>jadegreen</td>
<td>jadegreen</td>
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<td>jadegreen</td>
</tr>
<tr>
<td>lightcoral</td>
<td>lightgray</td>
<td>lightindigo</td>
<td>lightlightblue</td>
<td>lightlightgray</td>
<td>lightlightblue</td>
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</tr>
</tbody>
</table>

A huge amount of work is waiting to be done, e.g., increasing its efficiency and making it more compatible with TexLatex. If you have any comment that are helpful to this course, please don’t hesitate to contact me. I hope my effort is helpful to you and thank you for your attention.