

The `ccool` package^{*}

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Abstract

The package `ccool` for \LaTeX provides a *key-value* interface, `\Ccool`, meant to facilitate the generation of commands. Optional parameters that control the processing of the input and its expansion are set to their most likely usage. This can be used to encode notational conventions (such as `\Real` \rightarrow `\mathbb{R}`) at the point where they are introduced in the `document` (“Let \mathbb{R} denote real numbers”). Polymorphic commands can be generated by parameterizing the keys (for instance, one parameter value for style, another for a property). User input to `\Ccool` can optionally be serialized. This can be useful for typesetting documents sharing the same notation.

Résumé

L’extension `ccool` pour \LaTeX met à disposition une interface de type *clé-valeur*, `\Ccool`, destinée à faciliter la génération de commandes. Les paramètres optionnels contrôlant le traitement de ces *clé-valeur* sont fixés par défaut pour répondre aux besoins courants. Ceci peut-être utilisé pour la command-isation des conventions de notation (`\Reel` \rightarrow `\mathbb{R}`), au point dans le `document` où elles sont introduites (“Soit \mathbb{R} les nombres réels.”). Des commandes polymorphes peuvent être générées, en associant aux clés un paramètre (par exemple, une valeur pour le style typographique, une autre pour la description du concept associé). En option, les instructions passées à cette interface peuvent être sauvegardées, ce qui peut être utile pour la rédaction de documents faisant appel à des conventions typographiques communes.

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Part I

Usage

Convention

- a) Loosely, those of [2], for example as to the meaning of $\langle token\ list \rangle$.
- b) Those of [4], for example [arg] is a ‘o’-type argument.
- c) $\langle X \rangle \leftarrow Y$: set $\langle X \rangle$ to Y
- d) $\backslash X \rightarrow Y$: $\backslash X$ expands to Y
- e) If unspecified, the environment in which a macro is to be used is **document**.

<code>\usepackage</code>	<code>\usepackage{ccool}</code>
--------------------------	---------------------------------

Requirement

1. `ccool.sty` is in the path of the L^AT_EX engine. See [Part III, section 5](#).
2. Put in the *preamble*

<code>\Ccool</code>	<code>\Ccool[⟨tl₁⟩]<⟨tl₂⟩>c{⟨code₁⟩}{⟨kv₁⟩}+*s{⟨separators⟩}c{⟨code₂⟩}[⟨tl₆⟩]</code>
---------------------	--

where $\langle separators \rangle$ is either of: $\{\langle tl_3 \rangle\}$, $\{\langle tl_3 \rangle\}\{\langle tl_4 \rangle\}$, and $\{\langle tl_3 \rangle\}\{\langle tl_4 \rangle\}\{\langle tl_5 \rangle\}$.

Semantics See [subsection 2.1-2.8](#).

2.1 Core feature

`\Ccool{⟨kv1⟩}` defines for each $\langle key_i \rangle = \langle val_i \rangle$, the command $\backslash \langle key_i \rangle$, in two steps:

- 1) $\langle val_i \rangle \leftarrow \backslash function\{\langle val_i \rangle\}$
- 2) defines $\backslash \langle key_i \rangle$ such that $\backslash \langle key_i \rangle \rightarrow \langle val_i \rangle$,

where `\function` is controled by option **Inner**. For instance, the side effect of `\Ccool{Real = \mathbb{R}}` is $\backslash Real \rightarrow \backslash \mathbb{R}$. To be sparingly used, *option* **Expans** controls the way $\langle key_i \rangle$ and $\langle val_i \rangle$ are expanded.

See `\CcoolLambda` to allow command $\backslash \langle key_i \rangle$ to take arguments.

2.2 Process the val_i 's

`\Ccool c{⟨code1⟩}{⟨kv1⟩}` is identical to the **Core feature**, except it overrides **Inner**.

In our example, if multiple number systems are defined with `\Ccool` (natural, reals, ...), it is more efficient to omit `\mathbb{.}` inside $\langle val_i \rangle$ and, instead, use `c{\mathbb{#1}}`, where **#1** means “parameter to be replaced”.

2.3 Append to a hook

`\Ccool{⟨kv1⟩}+` is identical to the **Core feature**, except it repeats after `\CcoolHook`.

This is useful to make the side effect persist after a *local group* (such as **theorem**).

2.4 Expand the val_i 's

`\Ccool{⟨kv1⟩}*` supplements the **Core feature** with the expansion of the $\langle val_i \rangle$'s using typesetting rules controlled by *option* **Separ** and **Outer**. The first are *separators* applied to the $\langle val_i \rangle$'s to form a *token list*, and the second a function applied to the latter.

They can be overridden inline by appending further `s{⟨separators⟩}` and `c{⟨code2⟩}`, respectively, to the list of arguments.

2.5 Head

`\Ccool[⟨tl1⟩]{⟨kv1⟩}` expands $\langle tl_1 \rangle$ and executes the **Core feature**.

There may be situations where it is convenient to pass $\langle tl_1 \rangle$ as empty.

2.6 Tail

`\Ccool{⟨kv1⟩}[⟨tl6⟩]{⟨kv2⟩}` is identical to `\Ccool{⟨kv1⟩}` followed by `\Ccool[⟨tl6⟩]{⟨kv2⟩}`.

The combination of **Core feature**, **Head**, and **Tail** allows to integrate typesetting and the creation of commands.

2.7 Parameterize the *key*_{*i*}'s

`\Ccool<⟨tl2>⟩{⟨kv1⟩}` is identical to the **Core feature**, except *key*_{*i*} is replaced by *key*_{*i*}<⟨*tl*₂>⟩. The default parameter, that implicit in *key*_{*i*}, is controlled by **Param**. In our example, *tl*₂ could be **Style**.

2.8 Write

If *option* **Write** is set to `\BooleanTrue`, the **Core feature** is supplemented with the code written to a file, whose path is controlled by *option* **File**.

<code>\CcoolClear</code>	<code>\CcoolClear<⟨<i>tl</i>₂>⟩{⟨<i>clist</i>⟩}</code>
--------------------------	---

Semantics Clears all `\⟨keyi<⟨tl2>⟩`'s

<code>\CcoolHook</code>	<code>\CcoolHook</code>
-------------------------	-------------------------

Semantics No side effect or expansion

<code>\CcoolLambda</code>	<code>\CcoolLambda[⟨<i>arg spec</i>⟩]{⟨<i>code</i>⟩}</code> , where <i>arg spec</i> is by default an ‘ <i>o</i> ’-type argument.
---------------------------	---

Example `\Ccool{ EvalAt = \CcoolLambda{(#1)} }`

Semantics Returns a command of type `\DeclareDocumentCommand`[\[4\]](#),

<code>\CcoolOption</code>	<code>\CcoolOption{⟨<i>keyval list</i>⟩}</code>
---------------------------	---

Semantics Controls the default behavior of `\Ccool`.

Expans

Also see **Part IV**, **Expans**

Semantics See **Core feature**

Syntax `eo|ee|ex|xoxe|xx`

File

Also see **Part IV**, **File**

Semantics See **Write**

Syntax *⟨path⟩*

Inner

Also see [Part IV, Inner](#)

Semantics See [Process the \$val_i\$'s](#)

Syntax $\langle code \rangle$, with `###1` as the argument to be replaced

Param

Also see [Part IV, Param](#)

Semantics See [Parameterize the \$key_i\$'s](#)

Syntax $\langle token\ list \rangle$

Outer

Also see [Part IV, Outer](#)

Semantics See [Expand the \$val_i\$'s](#)

Syntax $\langle code \rangle$, with `###1` as the argument to be replaced

Separ

Also see [Part IV, Separ](#)

Semantics See [Expand the \$val_i\$'s](#)

Syntax That of *separators* in [\[2, Section 8 of l3seq\]](#)

Write

Also see [Part IV, Write](#)

Semantics See [Write](#)

Syntax $\langle boolean \rangle$

`\CcoolRead` `\CcoolRead[$\langle path \rangle$]`

Also see [Part IV, \CcoolRead](#)

Semantics

1. Reads the definitions in $\langle path \rangle$.
2. Writes to `ccool.log`: ‘read from $\langle path \rangle$ ’

`\CcoolVers` `\CcoolVers`

Semantics \rightarrow the package’s version

9 Do’s and dont’s

1)

Don’t: $\$ \langle key_i \rangle < x \$$.

Do: $\$ \backslash \langle key_i \rangle \{ < \} x \$$

2)

Don’t: $[a, b)$

Do: $\{ [] a, b \{ \}$

3)

Don't: `\cal F`.

Do: `\cal{F}` or `\mathcal{F}`

4)

Don't: `\[x_0,x\]`

Do: `\left[x_0,x\right]`

5)

Don't: Use '*d*'-type or '*e*'-type arguments for `\CcoolLambda`

Do: Use only '*m*'-type and '*o*'-type arguments

6) Also see [Part III, section 4](#)

Part II

Listing

NB:

1. These listings depend on the `\usepackage` statements of the source file’s **documentation**
2. Statements involving **Write** or **\CcoolClear** affect only the output of listings that come after that in which they appear. The demarcation is indicated by `%^A--->` and `%^A<---`, where applicable

Listing 1. `\CcoolVers`

```
\CcoolVers
```

2020/04/22 v2.6 cool — A key-value interface for generating commands

Listing 2. “Let \mathbb{N} and \mathbb{R} denote...” (start of the tutorial)

```
Let~$\mathbb{N}$ and $\mathbb{R}$ denote the natural and real numbers.
```

Let \mathbb{N} and \mathbb{R} denote the natural and real numbers.

Listing 3. Equivalent to **2**, with `\NewDocumentCommand`

```
\DeclareDocumentCommand\Nat{}{\mathbb{N}}
\DeclareDocumentCommand\Real{}{\mathbb{R}}
Let~$\Nat$ and $\Real$ denote the natural and real numbers.
```

Let \mathbb{N} and \mathbb{R} denote the natural and real numbers.

Listing 4. Equivalent to **3**, with `\Ccool`

```
%^A--->
\Ccool c{\mathbb{#1}}{ Nat = {N}, Real = {R} }
Let~$\Nat$ and $\Real$~denote the natural and real numbers.
%^A<---
\CcoolClear
```

Let \mathbb{N} and \mathbb{R} denote the natural and real numbers.

Listing 5. Equivalent to **4**, with expansion

```
%^A--->
\Ccool[Let~]
c{\mathbb{#1}}{ Nat = {N}, Real = {R} }*s{\rm{and}~}
[-denote the natural and real numbers.]{ }
%^A<---
\CcoolClear
```

Let \mathbb{N} and \mathbb{R} denote the natural and real numbers.

Listing 6. Equivalent to 4, parameterized (end of the tutorial)

```
%^A--->
\Ccool<Style>c{\mathbb{#1}}{ Nat = {N}, Real = {R} }
[Let $\Nat<Style>$ and $\Real<Style>$ denote the natural and real
 numbers.]{ }
%^A<---
\CcoolClear<Style>
```

Let \mathbb{N} and \mathbb{R} denote the natural and real numbers.

Listing 7. Separators

```
%^A--->
\CcoolOption{
  Separ={\ \char`@\ }{\ \%\ }{\ \char`@\ }}
\Ccool{ X = x, Y = y }*[\]
{ X = x, Y = y }*s{\&~}[\]
{ X = x, Y = y }*s{\{,~}\&~}[\[1em]]
{ X = x, Y = y, Z = z }*[\]
{ X = x, Y = y, Z = z }*s{\&~}[\]
{ X = x, Y = y, Z = z }*s{\{,~}\&~}[\]
{ X = x, Y = y, Z = z }*s{\&~}{,~}\&~}\
%^A<---
\CcoolClear
```

$x @ y$
 $x \& y$
 $x \& y$

$x \% y @ z$
 $x \& y \& z$
 $x, y, \& z$
 $x, y, \& z$

Listing 8. Hello, world! (testing)

```
\CcoolOption{ Write = \BooleanTrue }
%^A--->
\CcoolOption{Separ = {\}\{.}\{.}\}, Outer = {###1}}
\Ccool
<Test>{ KeyA = {.}, KeyB = {!}, KeyC = {\%} }[]
<Test>{ KeyD = {d}, KeyE = {\%} }[]
<Test>c{\{#1\}}{ KeyF = {H}, KeyG = {e}, KeyH = {1} }*[]
<Test>{ KeyI = {\%}, KeyJ = {\%}, KeyK = {\%} }[.\{1\}.\{o\}]
<Test>{ KeyL = {1}, KeyM = {\char`[]}, KeyN = {\char`[]} }[]
```

```

<Test>{ KeyO = {o}, KeyP = {\%}, KeyQ = {\%} }[{, \ }]
<Test>{ KeyR = {w}, KeyS = {o}, KeyT = {r} }*
s{{}}c{{\char`[]#1}[]}
<Test>{ KeyU = {\%}, KeyV = {\%}, KeyW = {\%} }[]
<Test>{ KeyX = {\%}, KeyY = {\%}, KeyZ = {\KeyB<Test>} }\nobreak
\KeyL<Test>\KeyD<Test>\KeyZ<Test>\KeyN<Test>\
%^^A<---
\CoolOption{ Write = \BooleanFalse }
\CoolClear

```

{H}. {e}. {l}. {l}. {o}, [world!]

Listing 9. Listing 8 read from file

```

%^^A<--->
\CoolRead
\KeyF<Test>\KeyA<Test>\nobreak
\KeyG<Test>\KeyA<Test>\nobreak
\KeyH<Test>\KeyA<Test>\nobreak
\KeyH<Test>\KeyA<Test>\nobreak
{\}\nobreak\KeyO<Test>{\}, {\} \nobreak
\KeyM<Test>\KeyR<Test>\nobreak
\KeyO<Test>\nobreak
\KeyT<Test>\nobreak
\KeyL<Test>\nobreak
\KeyD<Test>\nobreak
\KeyZ<Test>\nobreak
\KeyN<Test>\nobreak
%^^A<---
\CoolClear

```

{H}. {e}. {l}. {l}. {o}, [world!]

Listing 10. Probability space

```

\CoolOption{ Write = \BooleanTrue }
%^^A<--->
\Cool[Let~]
{ Space = \Omega, Field = \mathcal{F}, Meas = \mathcal{P} }
*s{{,}}c{\$ \{#1\}}
[~denote the probability space, where~]{ PowerSet = { 2^{\Space} } }
[{\Field\subset \PowerSet$.]
{}
\CoolOption{ Write = \BooleanFalse }
%^^A<---
\CoolClear

```

Let $\{\Omega, \mathcal{F}, \mathcal{P}\}$ denote the probability space, where $\mathcal{F} \subset 2^\Omega$.

Listing 11. Listing 10 read from file

```
%^A--->
\CcoolRead \tab $\Omega$ $\Field$ $\Meas$
%^A<---
\CcoolClear
```

 $\Omega \mathcal{F} \mathcal{P}$

Listing 12. Mittelwertsatz für n Variable[1, 17.3]

```
\CcoolOption{ Write = \BooleanTrue }
%^A--->
\newtheorem{theorem}{Theorem}
\AfterEndEnvironment{theorem}{\CcoolHook}
\Ccool c{\mathbb{#1}}
{ N = { N } , R = { R } }+[]
{ Grad = { \operatorname{grad} } }+
[\begin{theorem}
  [Mittelwertsatz f\"ur $n$ Variable]Es~sei~]
  { OffMenge = {D}, Ci = {C^{1}}, Strecke = { \left[x_0,x\right] } }+
  [$n\in\mathbb{N}$,~$\mathbb{R}^n$ eine offene Menge und
  $f\in C^1(\text{OffMenge},\mathbb{R})$.
  Dann gibt es auf jeder Strecke $\text{Strecke}\subset\text{OffMenge}$ einen Punkt
  $\xi\in\text{Strecke}$,~]
  { Steig = { \frac{ f(x)-f(x_0) }{ x-x_0 } }, Punkt = { \xi } }+
  [so dass gilt
  \begin{equation*}
    \text{Steig} = \text{Grad } f(\text{Punkt})^{\top}
  \end{equation*}
  \end{theorem}]
{}
(Check: $N$, $Punkt$)
%^A<---
\CcoolOption{ Write = \BooleanFalse }
\CcoolClear
```

Theorem 1 (Mittelwertsatz für n Variable) *Es sei $n \in \mathbb{N}$, $D \subseteq \mathbb{R}^n$ eine offene Menge und $f \in C^1(D, \mathbb{R})$. Dann gibt es auf jeder Strecke $[x_0, x] \subset D$ einen Punkt $\xi \in [x_0, x]$, so dass gilt*

$$\frac{f(x) - f(x_0)}{x - x_0} = \text{grad} f(\xi)^\top$$

(Check: \mathbb{N} , ξ)

Listing 13. Listing 12 read from file

```
%^A--->
\CcoolRead \tab $N$ $R$ $\text{OffMenge}$ $Ci$ $\text{Strecke}$
%^A<---
```

```
\CcoolClear
```

$$\mathbb{N} \mathbb{R} D C^1 [x_0, x]$$

Listing 14. Polynôme

```
\CcoolOption{ Write = \BooleanTrue }
% ^^A--->
\Ccool c{\mathbb{#1}}{ Nat = {N}, Reel = {R} }
[Soient~]
{ PolyR = \CcoolLambda[o]{\Reel\IfValueT{#1}{_#1}[X] } }
[ $\text{\PolyR}[n]$  et  $\text{\PolyR}$ , les familles de polynômes sur  $\text{\Reel}$ , de
degr\ 'e  $n$  et leur union pour  $n \in \text{\Nat}$ , respectivement. ]
{}
% ^^A<---
\CcoolOption{ Write = \BooleanFalse }
\CcoolClear
```

Soient $\mathbb{R}_n[X]$ et $\mathbb{R}[X]$, les familles de polynômes sur \mathbb{R} , de degré n et leur union pour $n \in \mathbb{N}$, respectivement.

Listing 15. Listing 14 read from file

```
% ^^A--->
\CcoolRead \tab  $\text{\PolyR}[n]$  et  $\text{\PolyR}$ 
% ^^A<---
\CcoolClear
```

$$\mathbb{R}_n[X] \text{ et } \mathbb{R}[X]$$

Listing 16. Same as Listing 16, but arbitrary number system

```
\CcoolOption{ Write = \BooleanTrue }
% ^^A--->
\Ccool c{\mathbb{#1}}{ Corps = {K}, Nat = {N}, Reel = {R} }
[Soient~]
{
  Poly = \CcoolLambda[om]{#2\IfValueT{#1}{_#1}[X] },
  PolyR = \CcoolLambda[o]{\Poly[#1]{\Reel}}
}
[ $\text{\Poly}[n]{\text{\Corps}}$  et  $\text{\Poly}{\text{\Corps}}$ , les familles de polynômes sur
 $\text{\Corps}$ , de degr\ 'e  $n$  et leur union pour  $n \in \text{\Nat}$ ,
respectivement. En particulier,
ils sont d\ 'enot\ 'es  $\text{\PolyR}[n]$  et  $\text{\PolyR}$ , pour  $\text{\Corps}=\text{\Reel}$ .]
{}
% ^^A<---
\CcoolOption{ Write = \BooleanFalse }
\CcoolClear
```

Soient $\mathbb{K}_n[X]$ et $\mathbb{K}[X]$, les familles de polynômes sur \mathbb{K} , de degré n et leur union pour $n \in \mathbb{N}$, respectivement. En particulier, ils sont dénotés $\mathbb{R}_n[X]$ et $\mathbb{R}[X]$, pour $\mathbb{K} = \mathbb{R}$.

Listing 17. Listing 16 read from file

```
%^A--->
\CcoolRead \tab $\PolyR[n]$ et $\PolyR$
%^A<---
\CcoolClear
```

$\mathbb{R}_n[X]$ et $\mathbb{R}[X]$

Listing 18. Fonction et fonctionnelle

```
\CcoolOption{ Write = \BooleanTrue }
%^A--->
\Ccool{ EvalAt = \CcoolLambda{(#1)}, ApplyOp = \CcoolLambda[mm]{#1[#2]} }
[Supposons une fonction $f\backslash EvalAt\{t\}$, et \etudions le probl\eme o\`u
  la fonctionnelle $\backslash ApplyOp\{S\}\{f\}$ est donn\ee par\dots]\{ }
%^A<---
\CcoolOption{ Write = \BooleanFalse }
\CcoolClear
```

Supposons une fonction $f(t)$, et étudions le problème où la fonctionnelle $S[f]$ est donnée par...

Listing 19. Listing 18 read from file

```
%^A--->
\CcoolRead \tab $f\backslash EvalAt\{t\}$, $\backslash ApplyOp\{S\}\{f\}$
%^A<---
\CcoolClear
```

$f(t)$, $S[f]$

Listing 20. CUSUM statistic[

```
\CcoolOption{ Write = \BooleanTrue }
%^A--->
\newtheorem{definition}{Definition}
\AfterEndEnvironment{definition}{\CcoolHook}
\Ccool{ SuchThat = { ;~ }, Time = { t }, Process = { \xi }, StopT = { T
  }, EvalAt = \CcoolLambda{(#1)} }
[The CUSUM statistic process and the corresponding one-sided CUSUM
  stopping time are defined as follows:
\begin{definition}\label{the CUSUM statistic}. Let~]
{ Scale = { \lambda }, Real = {\mathcal{R}} }+*s{\{-\in~}\}[\sim\sim]
{ CUSUMthresh = { \nu } }+*c{\$#1\in\Real^{+}}$.}
```

```

[~Define the following processes:]
{ LogWald = { u }, CUSUMst = { \StopT_{c} }, CUSUM = { y },
LogWaldInf = { m } }+
[\begin{enumerate}
\item{\$ \LogWald_{\Time} \EvalAt{ \Scale } = \Scale \Process_{\Time} -
\frac{1}{2} \Scale^2 \Time$;
\$ \LogWaldInf_{\Time} \EvalAt{ \Scale } = \inf_{ 0 \le s \le \Time
} \CUSUM_{s} \EvalAt{ \Scale }$.}
\item{\$ \CUSUM_{\Time} \EvalAt{ \Scale } = \LogWaldInf_{\Time} \EvalAt{
\Scale } - \LogWald_{\Time} \EvalAt{ \Scale } \ge 0$, which is the CUSUM
statistic process.}
\item{\$ \CUSUMst \EvalAt{ \Scale, \LogWaldInf } = \inf \left[ \Time \ge
0 \SuchThat \CUSUM_{\Time} \EvalAt{ \Scale } \ge \LogWaldInf \right]$,
which is the CUSUM stopping time.}
\end{enumerate} \end{definition} \par]{}

(Check: \$ \Scale$, \$ \CUSUM$)
% ^A<---
\CcoolOption{ Write = \BooleanFalse }
\CcoolClear

```

The CUSUM statistic process and the corresponding one-sided CUSUM stopping time are defined as follows:

Definition 1 . Let $\lambda \in \mathcal{R}$ and $\nu \in \mathcal{R}^+$. Define the following processes:

1. $u_t(\lambda) = \lambda \xi_t - \frac{1}{2} \lambda^2 t$; $m_t(\lambda) = \inf_{0 \leq s \leq t} y_s(\lambda)$.
2. $y_t(\lambda) = m_t(\lambda) - u_t(\lambda) \geq 0$, which is the CUSUM statistic process.
3. $T_c(\lambda, m) = \inf [t \geq 0; y_t(\lambda) \geq m]$, which is the CUSUM stopping time.

(Check: λ, y)

Listing 21. Listing 20 read from file

```

% ^A--->
% \CcoolRead \tab \$ \Time $ \$ \Process$ \$ \Scale$ \$ \Real$ \$ \CUSUMthresh$
\$ \LogWald$ \$ \CUSUMst$ \$ \CUSUM$ \$ \LogWaldInf$
% ^A<---
% \CcoolClear
%

```

$t \xi \lambda \mathcal{R} \nu u T_c y m$

Part III

Other

1 Acknowledgment

This work has benefited from Q&A's from the L^AT_EXcommunity[6][9]. Specific attributions are made throughout this document.

2 Genealogy

« Give commands the ability to contain the mathematical meaning while retaining the typesetting versatility » (`cool`[1]). The addition of 'c', in `ccool`, is for *custom*. With hindsight it is restrictive to describe `ccool` as a tool for encoding mathematical convention.

3 Install

- 1) Compile `ccool.dtx` (under Unix, `$tex ccool.dtx`)
- 2) Put the generated `ccool.sty` in the search path of the L^AT_EXengine

4 Issue

- 1) **Don't:** `Inner=\{####1\}`
Symptom: `\CcoolRead` fails
Do: `Inner={\char' {####1\char'}}`

5 Support

This package is available from <https://www.ctan.org/pkg/ccool> and <https://github.com/rogard/ccool>.

6 Testing

6.1 Technicality

Not possible to compile-check the expansion of a certain class of macros against predefined values[7]. Instead, one can visually check **Part II**, as generated in **section 3** on one's own machine, against that **of the repository** for the same version.

6.2 Platform

- i) Linux laptop 4.15.0-20-generic #21-Ubuntu SMP Tue Apr 24
↪ 06:16:15 UTC 2018 x86_64 x86_64 x86_64 GNU/Linux

6.3 Engine

- a) pdfTeX 3.14159265-2.6-1.40.20 (TeX Live 2019)
- b) pdfTeX 3.14159265-2.6-1.40.21 (TeX Live 2020)
- c) LuaHBTeX, Version 1.12.0 (TeX Live 2020)
- d) XeTeX 3.14159265-2.6-0.999992 (TeX Live 2020)

6.4 Results

- 1) ccool v1.8 compiles satisfactorily on platform *i)* and engine *a)*
- 2) ccool v1.8 compiles satisfactorily on platform *i)* and engine *b)*
- 3) ccool v1.9 compiles satisfactorily on platform *i)* and engines *b)* and *c)*
- 4) ccool v2.0 compiles satisfactorily on platform *i)* and engines *b)*, *c)*, and *d)*
- 5) ccool v2.1 compiles satisfactorily on platform *i)* and engines *b)*, *c)*, and *d)*
- 6) ccool v2.3 compiles satisfactorily on platform *i)* and engines *b)*, *c)*, and *d)*

6.5 Other

Check [5] for testing ccool with llncs

7 To do

- 1) Placeholder passed to Part IV \CcoolOption should be #1 not ####1
- 2) \CcoolOption should behave in away similar to that described in Part I subsection 6.7

References

- [1] Nick Setzer *The cool package*, 2005, <https://www.ctan.org/pkg/cool>
- [2] The L^AT_EX3 Project Team *The L^AT_EX3 interfaces*, 2019, <http://ftp.math.purdue.edu/mirrors/ctan.org/macros/latex/contrib/l3kernel/interface3.pdf>
- [3] Thomas F. Sturm *The tcolorbox package*, 2019, <http://www.texdoc.net/texmf-dist/doc/latex/tcolorbox/tcolorbox.pdf>
- [4] The L^AT_EX3 Project Team *The xparse package*, 2020, <http://ftp.math.purdue.edu/mirrors/ctan.org/macros/latex/contrib/l3packages/xparse.pdf>
- [5] Erwann Rogard and Olympia Hadjiliadis *Typesetting a math thesis with ccool*, 2020, <https://github.com/rogard/ccool/blob/master/thesis.pdf>
- [6] <https://tex.stackexchange.com/users/112708/erwann?tab=questions>
- [7] @joseph-wright’s answer to “Checking a function’s expansion against a string”, <https://tex.stackexchange.com/a/534100>
- [8] @frougon’s answer to “Journaling calls to a function []”, <https://tex.stackexchange.com/a/536620>

- [9] `\Ccool`, extension à L^AT_EX à vocation mathématique, <http://forum.mathematex.net/latex-f6/ccool-extension-latex-a-vocation-mathematique-t17314.html>

Change History

v1.0		Replace: <code>s{\langle tl_3 \rangle}{\langle tl_4 \rangle}{\langle tl_5 \rangle}</code> by
General: Initial version	18	<code>s{\langle tl_3 \rangle}{\langle tl_3 \rangle}{\langle tl_4 \rangle}{\langle tl_3 \rangle}{\langle tl_4 \rangle}{\langle tl_5 \rangle}</code>
v1.1		18
General: Add: <code>\Save</code>	18	v1.5
Add: Listing 1., 2., 3., 4., 6., and 9.	18	General: Add: <code>\File</code>
Add: <code>\OpsRestore</code>	18	Delete: dependence on <code>\datetime</code>
Add: <code>\OpsTest</code>	18	18
Delete: Listing 1-5 from v1.0	18	v1.6
Fix: apparent anomaly in v1.0's		General: Add: Listing showing part of
Listing 4, see Listing 8	18	the preamble
Rearrange: much of the		Rename: <code>\OpsClear</code> to
implementation	18	<code>\CcoolClear</code>
Replace:		Rename: <code>\OpsDebug</code> to
<code>\OpsOptions</code> by <code>\OpsOption</code>	18	<code>\CcoolDebug</code>
Replace: <code>{\langle kvl_2 \rangle}</code> by <code><kvl_2></code> given		Rename: <code>\OpsHook</code> to <code>\CcoolHook</code>
that option type G not		18
recommended[4]	18	Rename: <code>\OpsOption</code> to
Replace: <code>\GenericObject</code> by <code>\Name</code>	18	<code>\CcoolOption</code>
Replace: <code>\Separators</code> by <code>\Separ</code>	18	Rename: <code>\OpsRead</code> to <code>\CcoolRead</code>
		18
		Rename: <code>\Ops</code> to <code>\Ccool</code>
		18
		Rename: <code>oops</code> to <code>ccool</code> (better
		describes the purpose)
		18
v1.2		v1.7
General: Add: optional <code>*to \OpsNew</code>		General: Add: Legends to listings
as instruction to expand <code>kvl_1</code>	18	Add: Listing 20 (CUSUM)
Delete: <code>\OpsTest</code>	18	Delete: <code>\CcoolDebug</code>
Delete: <code>\langle kvl_2 \rangle</code> and <code>\langle code_2 \rangle</code>	18	Delete: Listing 5 from v1.6
Delete: Listing 2-3 from v1.1.	18	18
Replace: <code>\OpsClear{\langle tl_2 \rangle}</code> by		v1.8
<code>\OpsClear[\langle keyval list \rangle]</code>	18	General: Add: <code>\CcoolVers</code>
Replace: <code>\Restore</code> by <code>\Read</code>	18	Add: <code>\CcoolLambda</code>
Replace: <code>\Save</code> by <code>\Write</code>	18	Add: Listing 18, Listing 19
		Add: Listing 1
		18
v1.3		v1.9
General: Replace: <code>\OpsNew</code> by <code>\Ops</code>	18	General: Add: support for LuaT _E X
Replace: <code>{\langle tl_2 \rangle}</code> and <code>[\langle tl_2 \rangle]</code> by		Move: from Part I to Part IV, what
<code><\langle tl_2 \rangle></code>	18	is now that part's section 10
		18
v1.4		v2.0
General: Add: section 9	18	General: Add: support for X _Y T _E X
Add: <code>\OpsDebug</code>	18	Delete: <code>\File</code> 's dependency on
Add: <code>\OpsHook</code>	18	<code>texosquery</code> and <code>\pdfcreationdate</code>
Add: <code>\Expans</code> (for debugging' sake,		Update: <code>\RequirePackage</code> ,
but...)	18	<code>\NeedsTeXFormat</code> 's second
Add: Listing 1., 2., and 3.	18	argument / TeX Live 2020
Add: optional <code>*to \OpsNew</code> to make		18
side effects persist beyond local		v2.1
group	18	General: Add: Listings 3, 4, 5, 6, 7, 8,
Delete: Listing 1., and 2.	18	and 9
		18

Replace: $\langle tl_2 \rangle$'s position within \ccool's argument list, from first to second. Greater versatility	18	Remove: Listing showing part of the preamble	18
Replace: \ccoolLambda's optional integer argument (number of m's) by a standard argument list	18	Replace: for \ccool, i{ } by c{ } . .	18
Replace: Name by Param	18	Replace: In step 2), the created command's implementation, from \ProvidedocumentCommand to \DeclareDocumentCommand	18
Replace: as the de- fault of Param, Math by Default . .	18	v2.4	
v2.2		General: Fix: minor error in the listings (\Real rather than \Reel, hitherto unnoticed).	18
General: Remove: % from listings . . .	18	Remove: examples from Part I, \ccool, as redundant with Part II Listing 2-6	18
Replace: part of the abstract's with more straightforward descriptions based on input from forum participants	18	v2.5	
v2.3		General: Modify: File, rely on erw-l3's \erw_jobnametimestamp:	18
General: Add: Listing 15, Listing 16, and Listing 17	18	Modify: behavior of Part I, Expand the val _i 's, rely on erw-l3's \erw_seq_use:Nn	18
Complete: Listing 14	18	v2.6	
Rearranged: \ccool's subsections. Previously, by argument. Now, by feature.	18	General: Modify: \ccoolLambda, rely on erw-l3's \erw_lambda:nnn	18

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Part IV

Implementation

1 Opening

```

1 <*package>
2 <@@=ccool>
3 \ExplSyntaxOn

```

2 aux

```

\__ccool_aux_inner_set:n #1: <code>

4 \cs_new_protected:Nn \__ccool_aux_inner_set:n
5 {
6   \cs_gset:Npn \__ccool_aux_inner:n ##1 {#1}
7   \cs_generate_variant:Nn \__ccool_aux_inner:n { e }
8 }

(End definition for \__ccool_aux_inner_set:n.)

\__ccool_aux_key:w #1: <key>
#2: <value>

9 \cs_new_protected:Npn \__ccool_aux_key:w #1 = #2 \q_stop
10 {
11   \seq_gput_right:Nx \g__ccool_aux_key_seq { \tl_trim_spaces:n{#1} }
12 }

(End definition for \__ccool_aux_key:w.)

\__ccool_aux_key:n #1: <key = value>

13 \cs_new_protected:Nn \__ccool_aux_key:n
14 {
15   \__ccool_aux_key:w #1 \q_stop
16 }

(End definition for \__ccool_aux_key:n.)

\__ccool_aux_key:N #1: <seq>

17 \cs_new_protected:Nn \__ccool_aux_key:N
18 {
19   \seq_gclear_new:N \g__ccool_aux_key_seq
20   \seq_map_function:NN #1 \__ccool_aux_key:n
21 }

(End definition for \__ccool_aux_key:N.)

\__ccool_aux_outer_set:n #1: <inline code>

22 \cs_new_protected:Nn \__ccool_aux_outer_set:n
23 {
24   \cs_gset:Npn \__ccool_aux_outer:n ##1 {#1}
25 }

```

(End definition for _ccool_aux_outer_set:n.)

_ccool_aux_prop:nn

```

26 \prop_new:N \g__ccool\_aux\_prop
27 \cs_new_protected:Nn \_ccool\_aux\_prop:nn
28 {
29   \prop_gput:Nnn \g__ccool\_aux\_prop{#1}{#2}
30 }
31 \cs_generate_variant:Nn \_ccool\_aux\_prop:nn { eo, ee, ex, xo, xe, xx }

```

(End definition for _ccool_aux_prop:nn.)

_ccool_aux_prop:w

```

#1 : < key >
#2 : < value >

32 \tl_new:N \g__ccool\_option\_expans\_tl
33 \cs_new_protected:Npn \_ccool\_aux\_prop:w #1 = #2 \q_stop
34 {
35   \exp_args:Nx
36   \use:c{\_ccool\_aux\_prop:\g__ccool\_option\_expans\_tl}
37   { \tl_trim_spaces:n{#1} }
38   { \_ccool\_aux\_inner:n{ \tl_trim_spaces:n{#2} } }
39 }

```

(End definition for _ccool_aux_prop:w.)

_ccool_aux_prop:n

```

#1 : < key = value >

40 \cs_new_protected:Nn \_ccool\_aux\_prop:n
41 {
42   \_ccool\_aux\_prop:w #1 \q_stop
43 }

```

(End definition for _ccool_aux_prop:n.)

_ccool_aux_prop:N

```

#1 : < keyval list >

44 \cs_new_protected:Nn \_ccool\_aux\_prop:N
45 {
46   \prop_gclear_new:N \g__ccool\_aux\_prop
47   \seq_if_empty:NTF #1
48   { \c_empty_tl }
49   {
50     \seq_map_function:NN #1 \_ccool\_aux\_prop:n
51   }
52 }

```

(End definition for _ccool_aux_prop:N.)

_ccool_aux_val:Nn

```

#1 : < seq >
#2 : < tl var name >

53 \cs_new_protected:Nn \_ccool\_aux\_val:Nn
54 {
55   \seq_gclear_new:N \g__ccool\_aux\_val\_seq
56   \_ccool\_seq\_from\_prop:NNn \g__ccool\_aux\_val\_seq #1 { \_ccool\_prop\_name:n{#2} }
57 }

```

(End definition for _ccool_aux_val:Nn.)

3 log

`__ccool_log_close:`

```

58 \iow_new:N \g__ccool_log_iow
59 \AtEndDocument{\iow_close:N \g__ccool_log_iow}
60 \bool_set_false:N \g__ccool_log_open_bool
61 \cs_new_protected:Nn \__ccool_log_close:
62 {
63   \iow_close:N \g__ccool_log_iow
64   \bool_gset_false:N \g__ccool_log_open_bool
65 }

```

(End definition for __ccool_log_close:.)

`__ccool_log_open:`

```

66 \tl_new:N \g__ccool_log_file_tl
67 \cs_new_protected:Nn \__ccool_log_open:
68 {
69   \tl_gset:Nx \g__ccool_log_to_tl{\g__ccool_log_file_tl}
70   \iow_open:Nn \g__ccool_log_iow {\g__ccool_log_to_tl}
71   \bool_gset_true:N \g__ccool_log_open_bool
72 }

```

(End definition for __ccool_log_open:.)

`__ccool_log_read:n #1 : <path>`

```

73 \cs_new_protected:Nn \__ccool_log_read:n
74 {
75   \file_input:n{#1}
76   \tl_log:n{read~from~#1}
77 }
78 \cs_generate_variant:Nn \__ccool_log_read:n { e }

```

(End definition for __ccool_log_read:n.)

`__ccool_log_read:`

```

79 \cs_new_protected:Nn \__ccool_log_read:
80 {
81   \__ccool_log_read:e{\g__ccool_log_to_tl}
82 }

```

(End definition for __ccool_log_read:.)

`__ccool_log_write:n`

```

83 \tl_new:N \g__ccool_log_to_tl
84 \cs_new_protected:Nn \__ccool_log_write:n
85 {
86   \bool_if:nTF{ \g__ccool_log_open_bool }
87   {
88     \iow_now:Nn \g__ccool_log_iow {#1}
89     \tl_log:n{ write~to~#1 }
90   }
91   { \msg_error:nnnn{ __ccool }{ iow }{ \g__ccool_log_iow } } }
92 }
93 \cs_generate_variant:Nn \__ccool_log_write:n { e }

```

(End definition for __ccool_log_write:n.)

4 make_key

```

\__ccool_make_key:Nn #1 : < token >
#2 : < key >

94 \cs_new_protected:Nn \__ccool_make_key:Nn
95 {
96   \exp_args:NNx
97   \DeclareDocumentCommand{#1}
98   { D<>{\g__ccool_option_param_tl} }
99   {
100     \__ccool_prop_item:nn{#1}{#2}
101   }
102 }
103 \cs_generate_variant:Nn \__ccool_make_key:Nn {c}

(End definition for \__ccool_make_key:Nn.)

\__ccool_make_key:n #1 : < key >

104 \cs_new_protected:Nn \__ccool_make_key:n
105 {
106   \__ccool_make_key:cn{#1}{#1}
107 }
108 \cs_generate_variant:Nn \__ccool_make_key:n { e }

(End definition for \__ccool_make_key:n.)

\__ccool_make_key:N #1 : < seq >

109 \cs_new_protected:Nn \__ccool_make_key:N
110 {
111   \seq_map_function:NN #1 \__ccool_make_key:e
112 }

(End definition for \__ccool_make_key:N.)

```

5 make_ccool

```

\__ccool_make_ccool_exp:nnn

113 \cs_new_protected:Nn \__ccool_make_ccool_exp:nnn
114 {
115   \__ccool_aux_val:Nn \g__ccool_aux_key_seq {#1}
116   \__ccool_aux_outer_set:n{#3}
117   \__ccool_aux_outer:n
118   {
119     \exp_args:NNf
120     \erw_seq_use:Nn
121     \g__ccool_aux_val_seq
122     {#2}
123   }
124 }

(End definition for \__ccool_make_ccool_exp:nnn.)

```

_ccool_make_ccool_key:nnn

```

125 \cs_new_protected:Nn \_ccool\_make\_ccool\_key:nnn
126 {
127   \_ccool\_prop\_if\_exist:nTF{#1}
128   { \c_empty_tl }
129   { \_ccool\_prop\_new:n{#1} }
130   \exp_args:No \_ccool\_aux\_inner\_set:n{#2}
131   \seq_set_from_clist:Nn \g\_ccool\_aux\_keyval\_seq {#3}
132   \_ccool\_aux\_prop:N \g\_ccool\_aux\_keyval\_seq
133   \_ccool\_prop\_append:Nn \g\_ccool\_aux\_prop {#1}
134   \_ccool\_aux\_key:N \g\_ccool\_aux\_keyval\_seq
135   \_ccool\_make\_key:N \g\_ccool\_aux\_key\_seq
136 }

```

(End definition for _ccool_make_ccool_key:nnn.)

_ccool_make_ccool_sideeffect:nnn [8]

```

137 \cs_new_protected:Nn \_ccool\_make\_ccool\_sideeffect:nnn
138 {
139   \_ccool\_make\_ccool\_key:nnn{#1}{#2}{#3}
140   \bool_if:nTF{ \g\_ccool\_log\_open\_bool }
141   {
142     \_ccool\_log\_write:n
143     {
144       \begingroup
145       \def \_ccool\_log\_entry { \Ccool<#1>c{#2}{#3} } \expandafter
146       \endgroup \_ccool\_log\_entry
147     }
148   }{\c_empty_tl}
149 }

```

(End definition for _ccool_make_ccool_sideeffect:nnn.)

_ccool_make_ccool:nnnn #1 : < token list >
 #2 : < seq₁ >
 #3 : < seq₂ >
 #4 : < prop >

```

150 \cs_new_protected:Npn \_ccool\_make\_ccool:nnnn #1 #2 #3 #4
151 {
152   \exp_args:NNx \DeclareDocumentCommand \Ccool
153   {%^^A      2      3      4 5 6      7 8      9
154     +o D<>{#1} E{ c }{{#2}} m t+ s E{ s c }{{#3}{#4}} +o
155   }
156   {
157     \IfValueT{##1}{##1}
158     \_ccool\_make\_ccool\_sideeffect:nnn{##2}{##3}{##4}
159     \IfBooleanT{##6}
160     {
161       \_ccool\_make\_ccool\_exp:nnn{##2}{##7}{##8}
162     }
163     \bool_if:nTF{##5}
164     {
165       \gappto{\CcoolHook}
166       {

```

```

167         \_ccool_make_ccool_sideeffect:nnn{##2}{##3}{##4}
168     }
169 }
170 {\c_empty_tl}
171 \IfValueT{##9}
172 {
173     \exp_not:n{ \Ccool[##9] }
174 }
175 }
176 }

```

(End definition for _ccool_make_ccool:nnnn.)

6 msg

```

177 \msg_new:nnn {\_ccool}{ iow }{#1~is~closed~can't~write}

```

7 option

```

\_ccool_option_inner:n #1: <code>
178 \cs_new_protected:Nn \_ccool_option_inner:n
179 {
180     \tl_gset:Nn \g_ccool_option_inner_tl {#1}
181 }
182 \_ccool_option_inner:n
183 {
184     \msg_warning:nnn{ erw }{ csnset }{ \exp_not:N \g_ccool_option_inner_tl }
185 }

```

(End definition for _ccool_option_inner:n.)

```

\_ccool_option_param:n #1: <token list>
186 \cs_new:Nn \_ccool_option_param:n
187 {
188     \tl_gset:Nn \g_ccool_option_param_tl{#1}
189 }
190 \_ccool_option_param:n
191 {
192     \msg_error:nnx{ __ccool }
193     { generic }
194     { \exp_not:N\g_ccool_option_param_tl~undefined }
195 }

```

(End definition for _ccool_option_param:n.)

```

\_ccool_option_outer:n #1: <inline code>
196 \cs_new_protected:Nn \_ccool_option_outer:n
197 {
198     \tl_gset:Nn \g_ccool_option_outer_tl {#1}
199 }
200 \_ccool_option_outer:n
201 {
202     \msg_warning:nnn{ erw }{ csnset }{ \exp_not:N \g_ccool_option_outer_tl }
203 }

```

(End definition for _ccool_option_outer:n.)

```
\_ccool_option_separ:n #1 : {< tl1 >}{< tl2 >}{< tl3 >}
204 \cs_new_protected:Nn \_ccool_option_separ:n
205 {
206   \cs_gset:Npn \g_ccool_option_separ_tl {#1}
207 }
208 \_ccool_option_separ:n
209 {
210   \msg_warning:nnn{ erw }{ csnset }{ \exp_not:N \g_ccool_option_separ_tl }
211 }

(End definition for \_ccool_option_separ:n.)
```

8 prop

```
\_ccool_prop_append:NN #1 : < prop1 >
#2 : < prop2 >
212 \cs_new_protected:Npn \_ccool_prop_append:NN #1 #2
213 {
214   \cs_set:Nn \_ccool_prop_append:nn
215   {
216     \prop_gput:Nnx #1 {##1}{ \prop_item:Nn #2{##1} }
217   }
218   \prop_map_function:NN #2 \_ccool_prop_append:nn
219 }
220 \cs_generate_variant:Nn \_ccool_prop_append:NN { cN }

(End definition for \_ccool_prop_append:NN.)
```

```
\_ccool_prop_append:Nn #1 : < prop >
#2 : < tl var name >
221 \cs_new_protected:Nn \_ccool_prop_append:Nn
222 {
223   \_ccool_prop_append:cN{ \_ccool_prop_name:n {#2} } #1
224 }

(End definition for \_ccool_prop_append:Nn.)
```

```
\_ccool_prop_clear_new:n #1 : < tl var name >
225 \cs_new_protected:Nn \_ccool_prop_clear_new:n
226 {
227   \exp_args:No \prop_clear_new:c{ \_ccool_prop_name:n {#1} }
228 }

(End definition for \_ccool_prop_clear_new:n.)
```

```
\_ccool_prop_clear_new_map:n #1 : < keyval list >
229 \cs_new_protected:Nn \_ccool_prop_clear_new_map:n
230 {
231   \seq_set_from_clist:Nn \g_ccool_aux_key_seq {#1}
232   \seq_map_function:NN \g_ccool_aux_key_seq \_ccool_prop_clear_new:n
233 }
```

(End definition for `__ccool_prop_clear_new_map:n`.)

```
\__ccool_prop_if_exist:nTF #1 : <tl1>
#2 : <tl2>
#3 : <tl3>
234 \cs_new:Nn \__ccool_prop_if_exist:nTF
235 {
236   \prop_if_exist:cTF{ \__ccool_prop_name:n {#1} }{#2}{#3}
237 }
```

(End definition for `__ccool_prop_if_exist:nTF`.)

```
\__ccool_prop_item:nn #1 : <tl var name>
#2 : <key>
238 \cs_new:Nn \__ccool_prop_item:nn
239 {
240   \prop_item:cn { \__ccool_prop_name:n {#1} } {#2}
241 }
```

(End definition for `__ccool_prop_item:nn`.)

```
\__ccool_prop_name:n #1 : <tl var name>
242 \cs_new:Npn \__ccool_prop_name:n #1{ __ccool_#1 }
```

(End definition for `__ccool_prop_name:n`.)

```
\__ccool_prop_new:n #1 : <tl var name>
243 \cs_new_protected:Nn \__ccool_prop_new:n
244 {
245   \prop_new:c{ \__ccool_prop_name:n {#1} }
246 }
```

(End definition for `__ccool_prop_new:n`.)

9 seq

```
\__ccool_seq_from_prop:NNn #1 : <seq1>
#2 : <seq2> (keys)
#3 : <prop>
247 \cs_new_protected:Nn \__ccool_seq_from_prop:NNn
248 {
249   \cs_set_protected:Nn \__ccool_seq_from_prop:n
250   {
251     \seq_gput_right:No #1 { \prop_item:cn{#3}{##1} }
252   }
253   \seq_map_function:NN #2 \__ccool_seq_from_prop:n
254 }
```

(End definition for `__ccool_seq_from_prop:NNn`.)

10 Front-end

`\CcoolClear`

```
255 \NewDocumentCommand{ \CcoolClear }
256 { D<>{\g__ccool_option_param_tl} }
257 {
258   \__ccool_prop_clear_new_map:n{#1}
259 }
```

(End definition for `\CcoolClear`. This function is documented on page 6.)

`\CcoolHook`

```
260 \NewDocumentCommand{\CcoolHook}{\c_empty_tl}
```

(End definition for `\CcoolHook`. This function is documented on page 6.)

`\CcoolLambda`

```
261 \ProvideDocumentCommand \CcoolLambda { 0{m} m }
262 {
263   \erw_lambda:nnn \DeclareDocumentCommand { #1 } { #2 }
264 }
```

(End definition for `\CcoolLambda`. This function is documented on page 6.)

`\CcoolOption`

```
265 \NewDocumentCommand{ \CcoolOption }
266 { m }
267 {
268   \keys_set:nn{ __ccool }{#1}
269   %%A \bool_if:nTF{ \g__ccool_log_open_bool }
270   %%A {
271   %%A   \__ccool_log_write:n
272   %%A   {
273   %%A     \begingroup
274   %%A     \def \__ccool_log_entry { \CcoolOption{ #1 } \expandafter
275   %%A     \endgroup \__ccool_log_entry
276   %%A   }
277   %%A   }\c_empty_tl}
278   %%A }
279 }
```

(End definition for `\CcoolOption`. This function is documented on page 6.)

```
280 \keys_define:nn { __ccool }
281 {
```

Expans

```
282 Expans .multichoices:nn = { eo, ee, ex, xo, xe, xx }
283 { \tl_gset_eq:NN \g__ccool_option_expans_tl \l_keys_choice_tl },
284 Expans .default:n = { xo },
285 Expans .initial:n = { xo },
```

File

```

286 File .code:n = {
287   \tl_gset:Nx \g__ccool_log_file_tl{#1}
288 },
289 File .default:n = { \erw_sys_jobnametimestamp: },
290 File .initial:n = { \erw_sys_jobnametimestamp: },

```

Inner

```

291 Inner .code:n={
292   \__ccool_option_inner:n{#1}
293   \exp_last_unbraced:Nf
294   \__ccool_make_ccool:nnnn
295   {
296     { \g__ccool_option_param_tl }
297     { \g__ccool_option_inner_tl }
298     { \g__ccool_option_separ_tl }
299     { \g__ccool_option_outer_tl }
300   }
301 },
302 Inner .value_required:n = false,
303 Inner .default:n = {####1},
304 Inner .initial:n = {####1},

```

Param

```

305 Param .code:n={
306   \__ccool_option_param:n{#1}
307   \exp_last_unbraced:Nf
308   \__ccool_make_ccool:nnnn
309   {
310     { \g__ccool_option_param_tl }
311     { \g__ccool_option_inner_tl }
312     { \g__ccool_option_separ_tl }
313     { \g__ccool_option_outer_tl }
314   }
315 },
316 Param .value_required:n = false,
317 Param .default:n = { Default },
318 Param .initial:n = { Default },

```

Outer

```

319 Outer .code:n={
320   \__ccool_option_outer:n{#1}
321   \exp_last_unbraced:Nf
322   \__ccool_make_ccool:nnnn
323   {
324     { \g__ccool_option_param_tl }
325     { \g__ccool_option_inner_tl }
326     { \g__ccool_option_separ_tl }
327     { \g__ccool_option_outer_tl }
328   }
329 },
330 Outer .value_required:n = false,
331 Outer .default:n = { \ensuremath{####1} },
332 Outer .initial:n = { \ensuremath{####1} },

```

Separ

```
333 Separ .code:n={
334   \__ccool_option_separ:n{#1}
335   \exp_last_unbraced:Nf
336   \__ccool_make_ccool:nnnn
337   {
338     { \g__ccool_option_param_tl }
339     { \g__ccool_option_inner_tl }
340     { \g__ccool_option_separ_tl }
341     { \g__ccool_option_outer_tl }
342   }
343 },
344 Separ .value_required:n = false,
345 Separ .default:n = { {\ }and{\ } } { ,{\ } } { ,{\ }and{\ } },
346 Separ .initial:n = { {\ }and{\ } } { ,{\ } } { ,{\ }and{\ } },
```

Write

```
347 Write .code:n = {
348   \bool_if:nTF{#1}
349   {\__ccool_log_open:}
350   {\__ccool_log_close:}
351 },
352 Write .value_required:n = false,
353 Write .default:n = \BooleanFalse,
354 Write .initial:n = \BooleanFalse
355 }
```

\CcoolRead

```
356 \NewDocumentCommand{\CcoolRead}
357 {o}
358 {
359   \IfValueTF{#1}
360   {\__ccool_log_read:e{#1}}
361   {\__ccool_log_read:}
362 }
```

(End definition for \CcoolRead. This function is documented on page 7.)

\CcoolVers

```
363 \NewDocumentCommand{\CcoolVers}
364 {}
365 {\use:c{ver@ccool.sty}}
```

(End definition for \CcoolVers. This function is documented on page 7.)

11 Closing

```
366 \ExplSyntaxOff
367 \</package>
```