TLA$^+$ Video Course – Lecture 3

Leslie Lamport

RESOURCES AND TOOLS

This video should be viewed in conjunction with a Web page.
To find that page, search the Web for *TLA+ Video Course* .

The TLA$^+$ Video Course
Lecture 3
Resources and Tools

The first two lectures gave you an idea of what TLA+ is all about.

This lecture tells you about the resources available to help you learn TLA+, and introduces you to the TLA+ tools.

You will download the Toolbox and start learning to use the TLC model checker.

[slide 2]

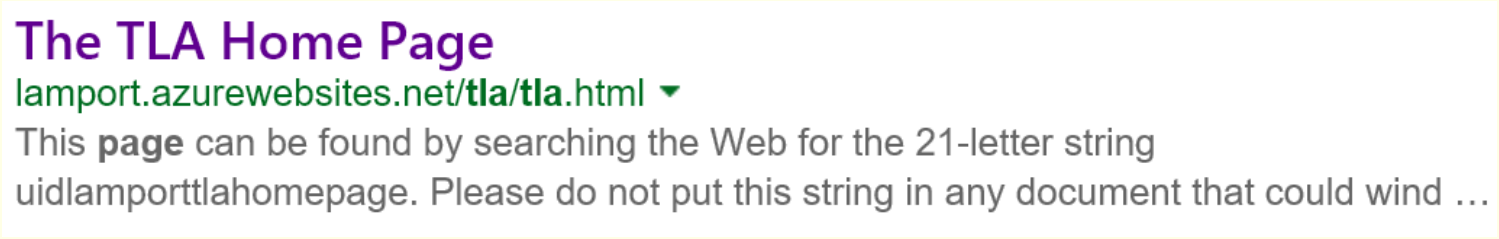
TLA$^+$ RESOURCES

The TLA$^+$ Home Page

The TLA+ home page.

The TLA+ Home Page

Searching the Web for *tla home page* yields



The TLA+ home page.

Search the web for *tla home page*

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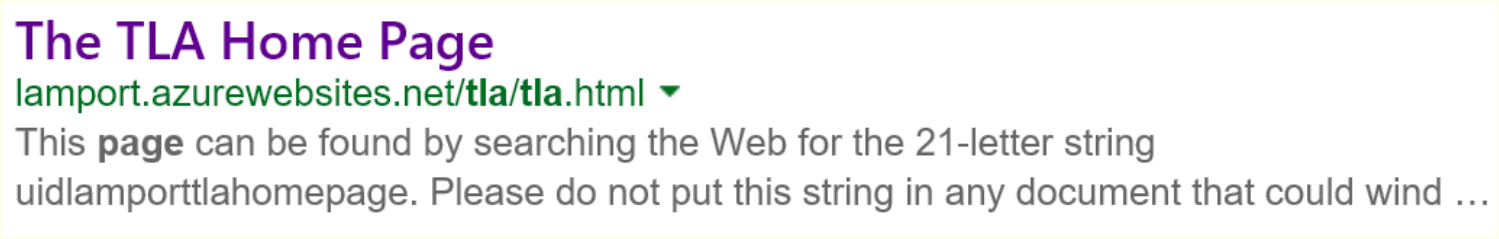


which links to . . .

The TLA+ home page.

Search the web for *tla home page*

to find a link to .

[slide 6]

The TLA Home Page

Last modified 14 July 1789

Contents

What is TLA?

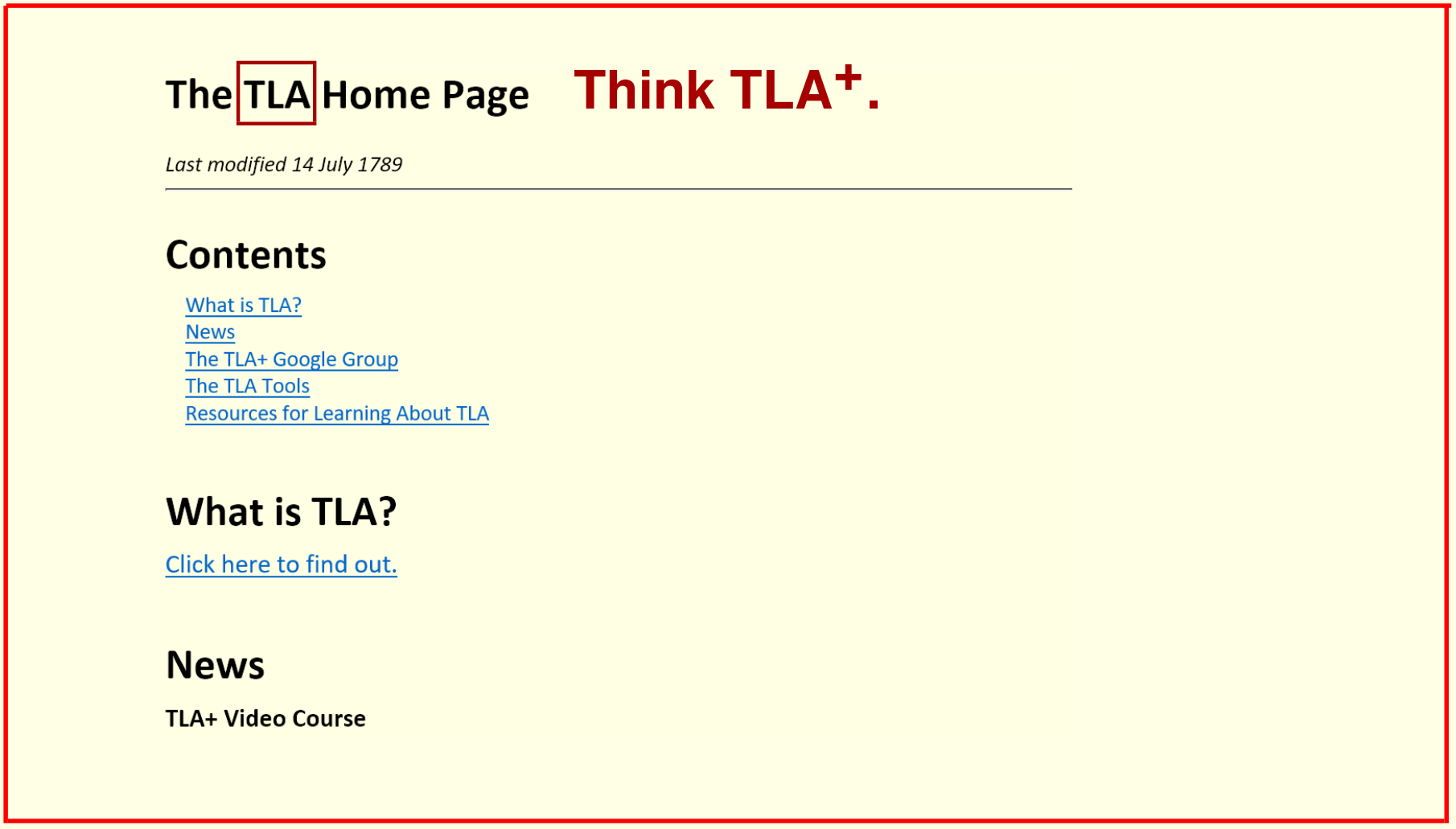
Click here to find out.

News

TLA+ Video Course

The TLA home page.

[slide 7]



The TLA home page.

For now, think of TLA as shorthand for TLA+.

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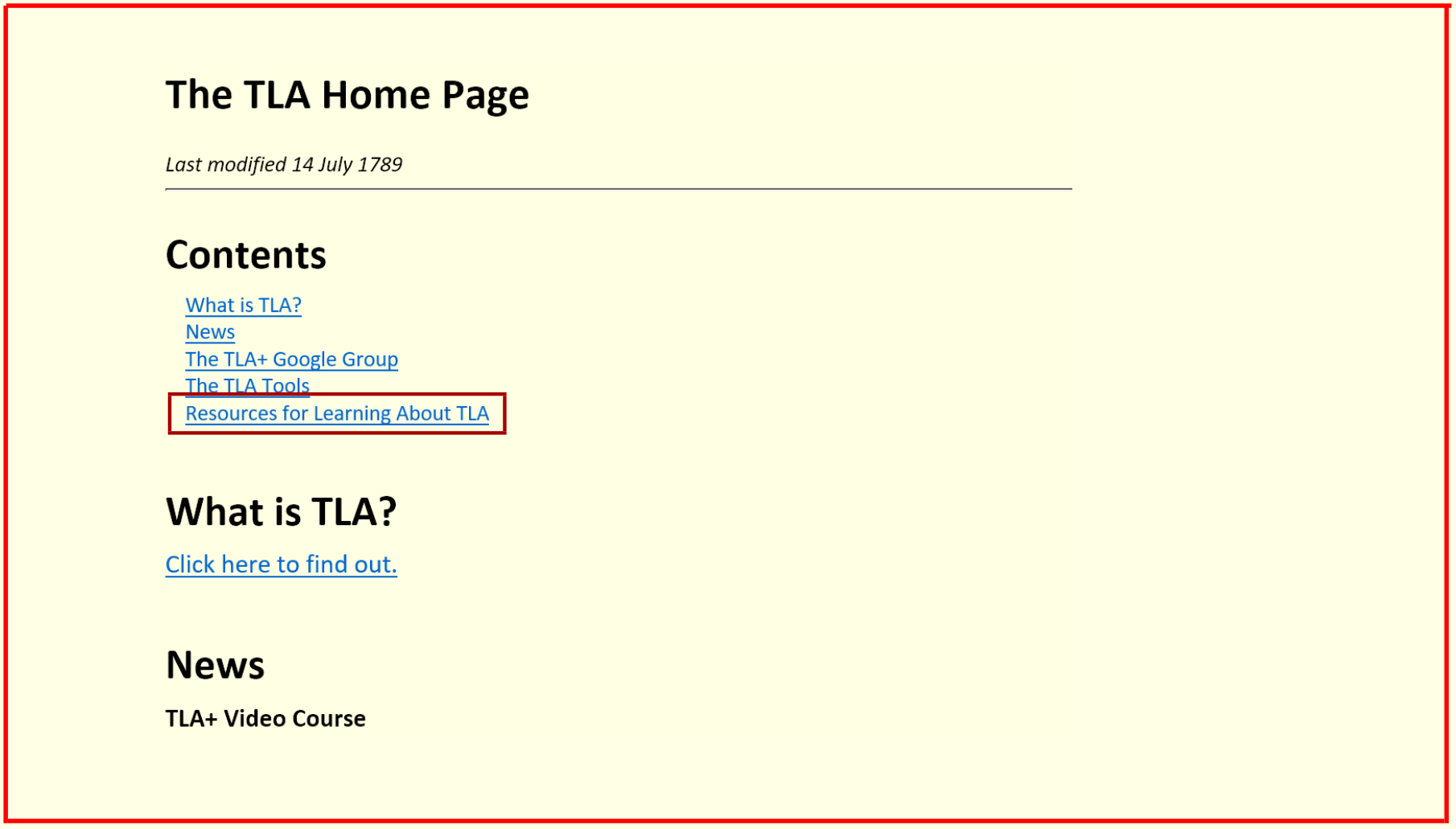

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[slide 10]

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- Other TLA Links Links to work relevant to TLA not on the TLA+ or TLAPS wel

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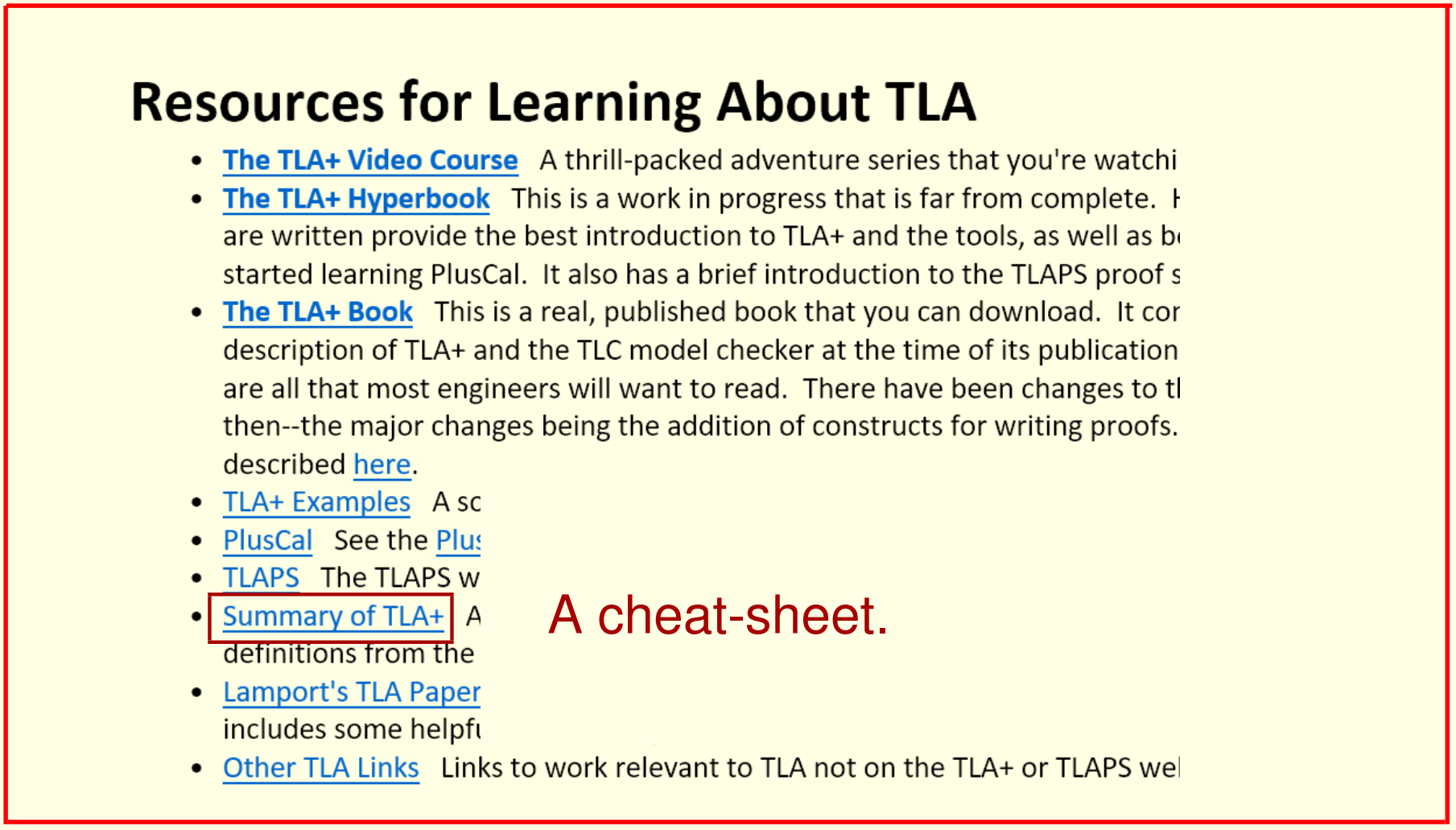

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Print it.

After watching the video, you should download and print it.

Most TLA$^+$ documentation is in pdf.

Most of the TLA$^+$ documentation consists of pdf documents.

Most TLA$^+$ documentation is in pdf.

You should have a pdf reader.

Most of the TLA$^+$ documentation consists of pdf documents.

If your computer doesn't already have a pdf reader, you should install one.

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Adobe Acrobat Reader is popular.

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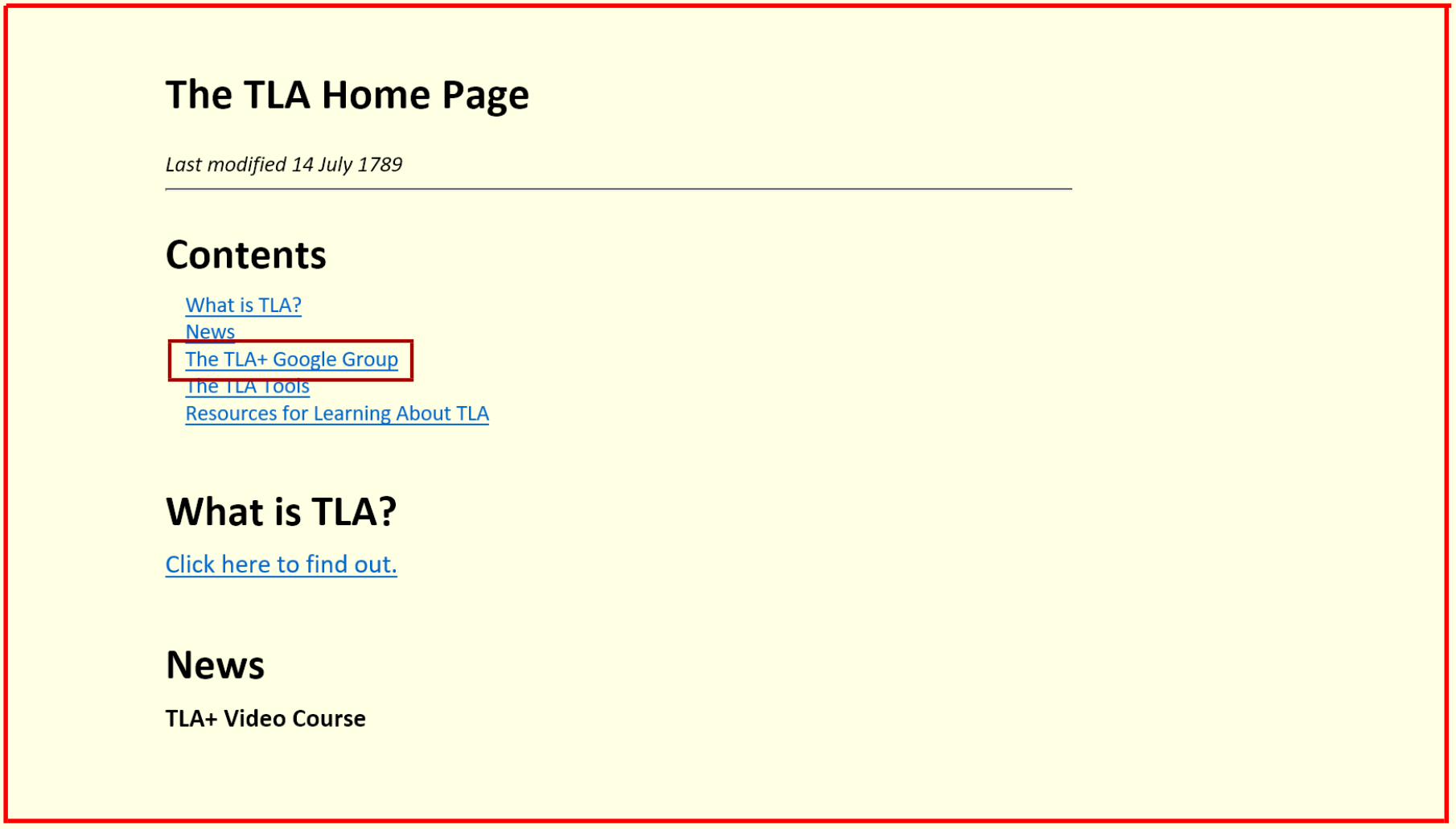

On the TLA home page . . .

go to the *TLA+ Google Group* section.

[slide 21]

The TLA+ Google Group

You can use the TLA+ Google group to communicate with members of the TLA+ community, including the maintainers of the tools. Post a message if you have a question, want to report a bug, or just want to tell us what you're doing with TLA+. The easiest way to post a message is to send email to `x@googlegroups.com` where `x` should be replaced by `tlaplus`.

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Find out what's happening in the TLA$^+$ community.

Ask other users for help if you have a problem.

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And ask other users for help if you have a problem.

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Join the group.

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find out what's happening in the TLA+ community.

And ask other users for help if you have a problem.

Join the group.

[slide 25]

DOWNLOADING THE TOOLBOX

The Toolbox:

The Integrated Development Environment
used to create specs and run tools on them.

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– Installing LaTeX

The Toolbox is the Integrated Development Environment used to create specs and run tools on them.

You will now download it which involves
– Installing Java, if it's not already on your computer.
– Downloading a zip file and extracting its files.
– Installing LayTek (or LahTek if you prefer)

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– Installing Java, if it's not already on your computer.

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– Installing LaTeX, required by the pretty-printer.

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– Installing Java, if it's not already on your computer.
– Downloading a zip file and extracting its files.
– Installing LayTek (or LahTek if you prefer)
which is required by the pretty-printer.

Stop the video now
and follow the instructions.

Stop the video now and follow the instructions.

[slide 33]

I will now start showing you how to use the Toolbox.

I will now start showing you how to use the Toolbox.

I will now start showing you how to use the Toolbox.

You should do yourself what I do

I will now start showing you how to use the Toolbox.

You should do yourself what I do in the video . . .

I will now start showing you how to use the Toolbox.

You should do yourself what I do,
stopping the video when you need to.

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Begin by starting the Toolbox now.

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You should do yourself what I do in the video . . .
stopping the video when you need to.

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If you encounter a problem, check the

If Something Goes Wrong

section of the downloading instructions.

If you encounter a problem, check the *If Something Goes Wrong* section of the downloading instructions.

If you encounter a problem, check the

If Something Goes Wrong

section of the downloading instructions.

If you can't solve the problem, try the TLA$^+$ Google group.

If you encounter a problem, check the *If Something Goes Wrong* section of the downloading instructions.

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CREATING A SPEC

Creating a specification.

THE PRETTY-PRINTER

The pretty-printer.

RUNNING TLC

Testing TLC.

Why Does TLC Report Deadlock?

Why Does TLC Report Deadlock?

Deadlock:

Execution stopped when it wasn't supposed to.

Why Does TLC Report Deadlock?

Deadlock:

Execution stopped when it wasn't supposed to.

Termination:

Execution stopped when it was supposed to.

MODULE *SimpleProgram*

EXTENDS *Integers*

VARIABLES i, pc

$$Init \triangleq (pc = \text{“start”}) \land (i = 0)$$

$$\begin{aligned} Pick \triangleq \lor &\land pc = \text{“start”} \\ &\land i' \in 0 \,..\, 1000 \\ &\land pc' = \text{“middle”} \end{aligned}$$

$$\begin{aligned} Add1 \triangleq \lor &\land pc = \text{“middle”} \\ &\land i' = i + 1 \\ &\land pc' = \text{“done”} \end{aligned}$$

$$Next \triangleq Pick \lor Add1$$

Says nothing about whether an execution should stop.

Most systems should not stop.

HELP !

I know you want to start writing specs

I know you want to start writing specs,
not reading *Help* pages.

I know you want to start writing specs,
not reading *Help* pages.

But read the *Getting Started* section
before going on to the next video.

I know you want to start writing specs,
not reading *Help* pages.

But read the *Getting Started* section
before going on to the next video.

Take time out from specifying to
browse through the other sections.

THE TLA$^+$ PROOF SYSTEM

The TLA+ proof system.

TLA$^+$ has constructs for writing theorems
and formal proofs of those theorems.

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and formal proofs of those theorems.

TLAPS is a tool for checking those proofs.

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TLAPS, the TLA$^+$ proof system, is a tool for checking those proofs.

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It can be run from the Toolbox.

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TLAPS can check proofs of correctness of algorithms

TLAPS can check proofs of correctness of real, publishable algorithms

TLAPS can check proofs of correctness of algorithms,
but it will be used by few engineers.

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Perhaps a future video will describe how to write and check proofs.

TLAPS can check proofs of correctness of real, publishable algorithms but it will be used by few engineers.

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THE UNICODE OPTION

The Unicode option.

Most engineers prefer the ASCII version of their specs.

I’ve found that most engineers prefer the ASCII version of their specs.

Most engineers prefer the ASCII version of their specs.

I use the pretty-printed version only for publication.

I've found that most engineers prefer the ASCII version of their specs.

I use the pretty-printed version only for publication.

Most engineers prefer the ASCII version of their specs.

I use the pretty-printed version only for publication.

Some people want to see $\in$

I've found that most engineers prefer the ASCII version of their specs.
I use the pretty-printed version only for publication.

But some people would prefer to see this set membership symbol

Most engineers prefer the ASCII version of their specs.

I use the pretty-printed version only for publication.

Some people want to see $\in$ rather than `\in`
when writing specs.

I've found that most engineers prefer the ASCII version of their specs.

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But some people would prefer to see this set membership symbol rather than `backslash-i-n` when writing specs.

Most engineers prefer the ASCII version of their specs.

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Some people want to see $\in$ rather than `\in` when writing specs.

We intend to make them happy.

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We plan to provide an editor option to display symbols as Unicode characters.

We plan to provide the Toolbox's module editor with an option to display symbols as Unicode characters rather than as ASCII strings.

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Check the documentation

We plan to provide the Toolbox's module editor with an option to display symbols as Unicode characters rather than as ASCII strings.

Check the TLA$^+$ documentation

We plan to provide an editor option to display symbols as Unicode characters.

Check the documentation, the Google Group

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Check the documentation, the Google Group, or the Toolbox's *Help* pages to see if it's there and how to use it.

We plan to provide the Toolbox's module editor with an option to display symbols as Unicode characters rather than as ASCII strings.

Check the TLA$^+$ documentation or the TLA$^+$ Google Group or the Toolbox's Help pages to see if it's there and how to use it if it is.

Now that you've installed the Toolbox and TLC, we can start having fun.

In the next lecture, we'll play the roles of Bruce Willis and Samuel L. Jackson in the 1995 action movie Die Hard 3.

But we get to use a weapon that they didn't have: POW! the TLC model checker.

[slide 71]

End of Lecture 3

RESOURCES AND TOOLS

This is the end of Lecture 3 of the TLA+ Video Course

—

Installing the Toolbox.