Beamer and TikZ Workshop

Andrew Mertz
William Slough

Mathematics and Computer Science Department
Eastern Illinois University

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Morning overview: Beamer

- Benefits of using Beamer
- Examples
  - A tiny example
  - Basic frame ingredients

    `\begin{frame}`, `\frametitle`, `\end{frame}`
  - Static frame contents
    - Lists, mathematics, tables, verbatim text, graphics
    - Colors and tables via `xcolor`
    - Two columns
  - Incremental frame contents
    - Tables and lists with `\pause`
    - Lists with `\onslide`
    - Tic-tac-toe with `\onslide` and multiple graphics files
    - Highlighting items of a list
- Ornaments: fonts and themes
- Producing *N*-up output with `pdfjam` and `pdfpages`
- Pitfalls
- Exercises

Benefits of using Beamer

- LaTeX-based, platform-independent
- Extensively documented (224 pages)
- Provides color
- Rich, dynamic effects
- Generates PDF output suitable for both presentation and printing
- Easy to learn and use
- Flexible

A tiny example

```
\documentclass{beamer}

\title{A Tiny Example}
\author{Andrew Mertz and William Slough}
\date{July 17, 2007}

\begin{document}

\maketitle

\begin{frame}
 \frametitle{First Slide}
 Contents of the first slide
\end{frame}

\begin{frame}
 \frametitle{Second Slide}
 Contents of the second slide
\end{frame}

\end{document}
```

A Tiny Example

Andrew Mertz and William Slough

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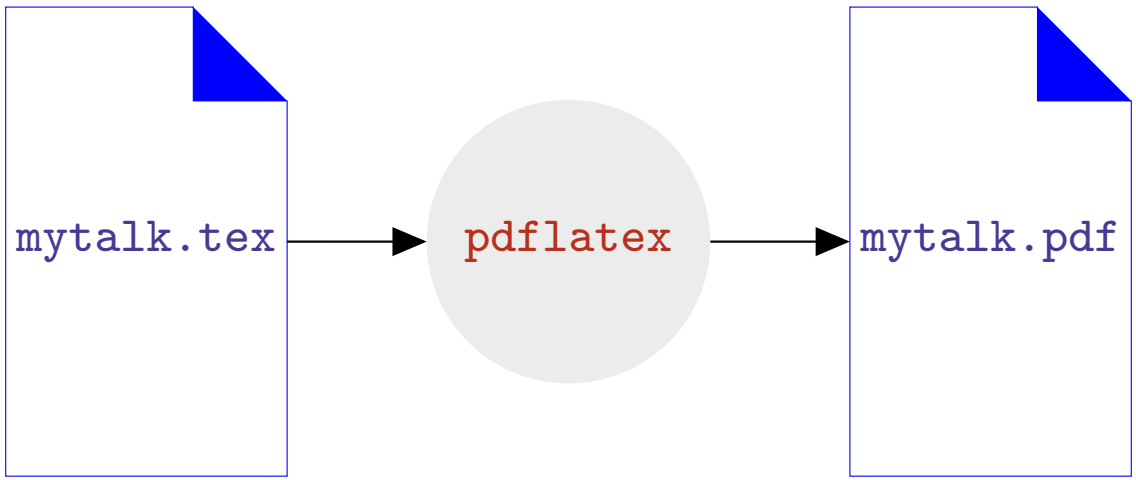
First slide

Contents of the first slide

Second slide

Contents of the second slide

Processing



```
\documentclass{beamer}

\title{Desired title of talk}
\author{Your name}
\date{July 17, 2007}

\begin{document}

\maketitle

\begin{frame}
  \frametitle{Desired title}
  Desired content
\end{frame}

\begin{frame}
  \frametitle{Desired title}
  Desired content
\end{frame}

\end{document}
```

Try it out!

Frame ingredients

- Headline and footline
- Left and right sidebar
- Navigation bars
- Logo
- Frame title
- Background
- Content

Frame content

- Lists
- Mathematics
- Tables
- Verbatim text
- Graphics
- Other packages
- ...

Example: lists

```
\begin{frame}

\frametitle{Frame content}

\begin{itemize}
  \item Lists
  \item Mathematics
  \item Tables
  \item Verbatim text
  \item Graphics
  \item Other packages
  \item $\ldots$
\end{itemize}

\end{frame}
```

To exert fine-control over spacing, use a command like:

```
\setlength{\itemsep}{2ex}
```

within the `itemize` environment.

L'Hôpital's rule

If

f and g are differentiable,

$\lim_{x\to\infty} f(x) = \infty$, and

$\lim_{x\to\infty} g(x) = \infty$,

then

$$\lim_{x\to\infty} \frac{f(x)}{g(x)} = \lim_{x\to\infty} \frac{f'(x)}{g'(x)}.$$

Example: mathematics

```
\begin{frame}
\frametitle{L'H\^{o}pital's Rule}

 If
 \begin{itemize}
   \item[] $f$ and $g$ are differentiable,
   \item[] $\lim_{x \rightarrow \infty}f(x) = \infty$, and
   \item[] $\lim_{x \rightarrow \infty}g(x) = \infty$,
   \end{itemize}
 then
 \begin{itemize}
  \item[] $\lim_{x \rightarrow \infty}\frac{f(x)}{g(x)} =
           \lim_{x \rightarrow \infty}\frac{f'(x)}{g'(x)}$.
 \end{itemize}

\end{frame}
```

Practical TEX 2005 events

8-9 am	Registration	
9 am	Karl Berry	Opening
9:15 am	Nelson Beebe	Keynote address
10:15 am	Break	
10:30 am	Peter Flom	A True Beginner Looks at LATEX
11 am	Anita Schwartz	The Art of LATEX Problem Solving
11:45 am	Steve Peter	Introduction to memoir
12:30 pm	Lunch	

Example: tables

```
\begin{frame}
\frametitle{Practical \TeX\ 2005 Events}

\begin{center}
  \begin{tabular}{|r|l|l|}\hline
    8-9 am   & Registration   & \\
    9 am     & Karl Berry     & Opening \\
    9:15 am  & Nelson Beebe   & Keynote address \\
    10:15 am & Break          & \\
    10:30 am & Peter Flom     & A True Beginner Looks at \LaTeX  \\
    11 am    & Anita Schwartz & The Art of \LaTeX\ Problem Solving \\
    11:45 am & Steve Peter    & Introduction to memoir \\
    12:30 pm & Lunch          & \\ \hline
  \end{tabular}
\end{center}

\end{frame}
```

Verbatim text

```
\begin{frame}
\frametitle{Practical \TeX\ 2005 Events}
\begin{center}
  \begin{tabular}{|r|l|l|}\hline
    8-9 am   & Registration   & \\
    9 am     & Karl Berry     & Opening \\
    9:15 am  & Nelson Beebe   & Keynote address \\
    10:15 am & Break          & \\
    10:30 am & Peter Flom     & A True Beginner Looks at \LaTeX  \\
    11 am    & Anita Schwartz & The art of \LaTeX\ Problem Solving \\
    11:45 am & Steve Peter    & Introduction to memoir \\
    12:30 pm & Lunch          & \\ \hline
  \end{tabular}
\end{center}
\end{frame}
```

Example: verbatim

```
\begin{frame}[fragile]
\frametitle{Verbatim Text}
{\scriptsize
\begin{verbatim}
\begin{frame}
\frametitle{Practical \TeX\ 2005 events}
\begin{center}
  \begin{tabular}{|r|l|l|}\hline
    8-9 am   & Registration   & \\
    9 am     & Karl Berry     & Opening \\
    9:15 am  & Nelson Beebe   & Keynote address \\
    10:15 am & Break          & \\
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    11:45 am & Steve Peter    & Introduction to memoir \\
    12:30 pm & Lunch          & \\ \hline
  \end{tabular}
\end{center}
\end{frame}
\end{verbatim}
}
\end{frame}
```

Practical TEX 2005 logo

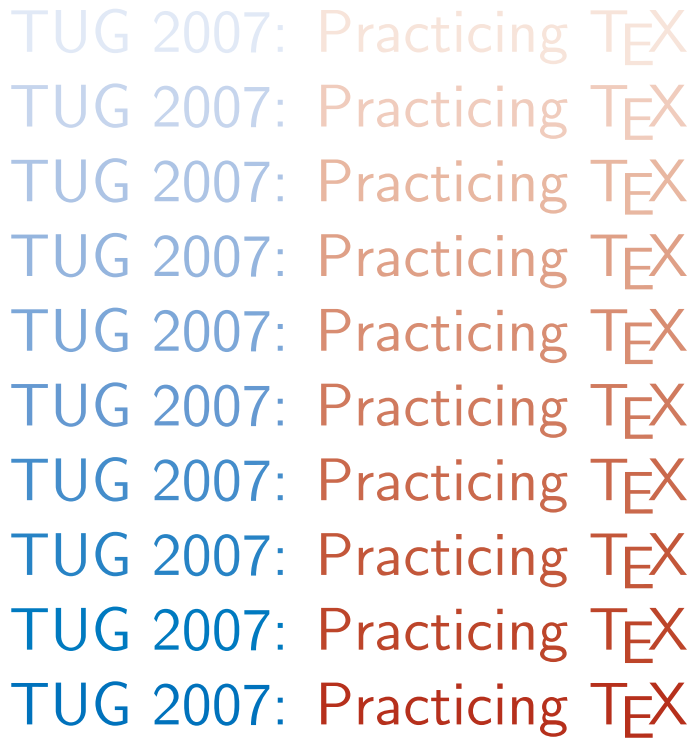
Example: graphics

```
\begin{frame}
\frametitle{Practical \TeX\ 2005 logo}

\begin{center}
  \includegraphics[height=3.25in]{p2005}
\end{center}

\end{frame}
```

Colors via `xcolor`



Example: xcolor

```
\begin{frame}
\frametitle{Colors via {\tt xcolor}}

\begin{center}
{\color{BlueViolet!10} TUG 2007:} {\color{BrickRed!10} Practicing \TeX} \\
{\color{BlueViolet!20} TUG 2007:} {\color{BrickRed!20} Practicing \TeX} \\
{\color{BlueViolet!30} TUG 2007:} {\color{BrickRed!30} Practicing \TeX} \\
{\color{BlueViolet!40} TUG 2007:} {\color{BrickRed!40} Practicing \TeX} \\
{\color{BlueViolet!50} TUG 2007:} {\color{BrickRed!50} Practicing \TeX} \\
{\color{BlueViolet!60} TUG 2007:} {\color{BrickRed!60} Practicing \TeX} \\
{\color{BlueViolet!70} TUG 2007:} {\color{BrickRed!70} Practicing \TeX} \\
{\color{BlueViolet!80} TUG 2007:} {\color{BrickRed!80} Practicing \TeX} \\
{\color{BlueViolet!90} TUG 2007:} {\color{BrickRed!90} Practicing \TeX} \\
{\color{BlueViolet!100} TUG 2007:} {\color{BrickRed!100} Practicing \TeX}
\end{center}

\end{frame}
```

Colors

GreenYellow Yellow Goldenrod Dandelion Apricot Peach Melon
YellowOrange Orange BurntOrange Bittersweet RedOrange
Mahogany Maroon BrickRed Red OrangeRed RubineRed
WildStrawberry Salmon CarnationPink Magenta VioletRed
Rhodamine Mulberry RedViolet Fuchsia Lavender Thistle Orchid
DarkOrchid Purple Plum Violet RoyalPurple BlueViolet Periwinkle
CadetBlue CornflowerBlue MidnightBlue NavyBlue RoyalBlue Blue
Cerulean Cyan ProcessBlue SkyBlue Turquoise TealBlue
Aquamarine BlueGreen Emerald JungleGreen SeaGreen Green
ForestGreen PineGreen LimeGreen YellowGreen SpringGreen
OliveGreen RawSienna Sepia Brown Tan Gray Black White

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Example: table with color

```
\begin{frame}
\frametitle{Practical \TeX\ 2005 events}

\begin{center}
  \rowcolors{1}{RoyalBlue!20}{RoyalBlue!5}
  \begin{tabular}{|r|l|l|}\hline
    8-9 am   & Registration   & \\
    9 am     & Karl Berry     & Opening \\
    9:15 am  & Nelson Beebe   & Keynote address \\
    10:15 am & Break          & \\
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    12:30 pm & Lunch          & \\ \hline
  \end{tabular}
\end{center}

\end{frame}
```

Revising documentclass for xcolor

```
\documentclass[xcolor=pdftex,dvipsnames,table]{beamer}
```

- Beamer loads some packages automatically
- `\usepackage{...}` cannot be used for such packages
- Package options are specified within `documentclass`
- `xcolor=...` specifies options for `xcolor`
- `pdftex` specifies the correct driver for `pdflatex`
- `dvipsnames` loads the Crayola/`dvips` colors
- `table` loads the `colortbl` package

Font sizes

`\tiny`	tiny	`\large`	large
`\scriptsize`	scriptsize	`\Large`	Large
`\footnotesize`	footnotesize	`\LARGE`	LARGE
`\small`	small	`\huge`	huge
`\normalsize`	normalsize	`\Huge`	Huge

A race condition

Two people share a checking account. They each visit an ATM machine in different parts of town at approximately noon. One deposits $100; the other withdraws $100.

What happens?

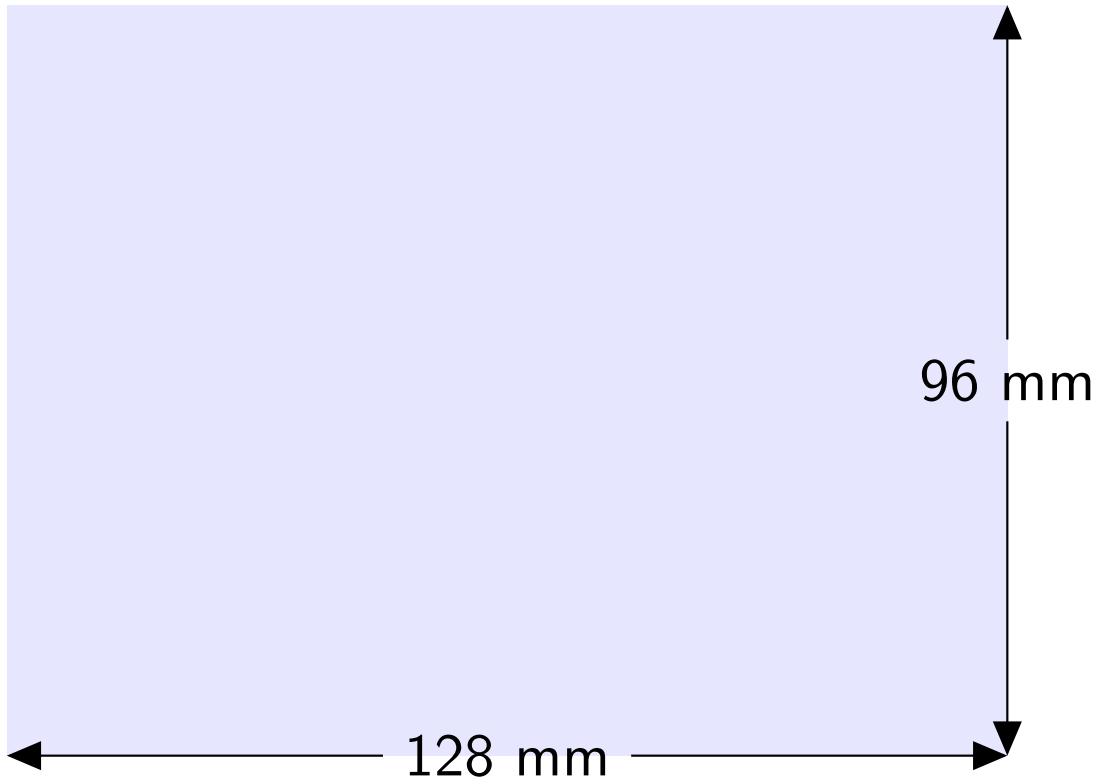
Process A

```
...
balance += 100;
...
```

Process B

```
...
balance -= 100;
...
```

Beamer frame dimensions



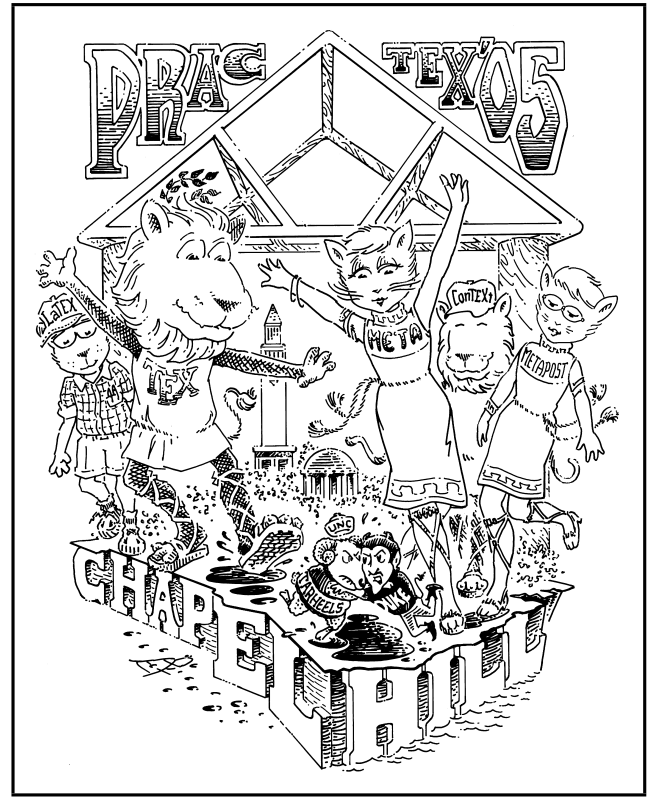
Example: two columns

```
Two people share a checking account.  They each visit an ATM
machine in different parts of town at approximately noon.
One deposits \$100; the other withdraws \$100.
\vspace{2ex}  What happens?  \vspace{2ex}

\begin{columns}[t]
\column{3cm}
{\color{BrickRed} \centerline{Process A}
\begin{verbatim}
...
balance += 100;
...
\end{verbatim}
}
\column{3cm}
{\color{BlueViolet} \centerline{Process B}
\begin{verbatim}
...
balance -= 100;
...
\end{verbatim}
}
\end{columns}
```

Text and graphics

Practical TEX 2005
Practical TEX 2005
Practical TEX 2005



Example: text and graphics

```
\begin{frame}
\frametitle{Text and graphics}

\begin{columns}[c]
\column{1.5in}
Practical \TeX\ 2005\\
Practical \TeX\ 2005\\
Practical \TeX\ 2005

\column{1.5in}
\framebox{\includegraphics[width=1.5in]{p2005}}
\end{columns}

\end{frame}
```

Incremental frame contents

- Tables with `\pause`
- Lists with `\pause`
- Lists with `\onslide`
- Tic-tac-toe via `tabular` and `\onslide`
- Tic-tac-toe via multiple graphics files
- Highlighting items

Software complexity

Date	Developer	OS	Lines of C
1976	Thompson/Ritchie	AT&T UNIX	9,000
1997	Tanenbaum	Minix	62,000
1999	Torvalds	Linux	1,000,000
2000	Cutler *et al.*	Windows NT	28,000,000

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2000	Cutler *et al.*	Windows NT	28,000,000

Example: table with pause

```
\begin{frame}
\frametitle{Software complexity}

\setbeamercovered{dynamic}
\renewcommand{\arraystretch}{1.2}
\begin{tabular}{c|c|c|c}
Date & Developer & OS & Lines of C\\ \hline \hline
1976 & Thompson/Ritchie     & AT\&T UNIX & 9,000      \\  \hline \pause
1997 & Tanenbaum            & Minix      & 62,000     \\  \hline \pause
1999 & Torvalds             & Linux      & 1,000,000  \\  \hline \pause
2000 & Cutler {\em et al.}  & Windows NT & 28,000,000 \\  \hline \hline
\end{tabular}

\end{frame}
```

Frames and overlays

- A frame consists of one or more overlays
- Dynamic effects can be achieved by using overlays
- Inserting `\pause` is one way to create a new overlay

Possible objections to using TEX

- I've heard TEX and LATEX are not WYSIWYG

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- I don't know who to ask for help
  TEX Users Group – `www.tug.org`
  News group – `comp.text.tex`
  Google search

Example: list with pause

```
\begin{frame}[fragile]
\frametitle{Possible Objections To Using \TeX}

\setbeamercovered{invisible}
\begin{itemize}
 \setlength{\itemsep}{2ex}
 \item I've heard \TeX\ and \LaTeX\ are not WYSIWYG\\ \pause
 {\color{BrickRed} \TeX\ is a mark-up language} \pause

 \item \LaTeX\ is not installed on my computer\\ \pause
 {\color{BrickRed}  ProText, \TeX Live, \TeX Shop} \pause

 \item I don't know who to ask for help\\ \pause
 {\color{BrickRed} \TeX\ Users Group -- {\tt www.tug.org}\\
              News group -- {\tt comp.text.tex}\\
              Google search}
\end{itemize}

\end{frame}
```

Possible objections to using TEX

- I've heard TEX and LATEX are not WYSIWYG
  TEX is a mark-up language
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  Google search

Example: list with onslide

```
\begin{frame}[fragile]
\frametitle{Possible objections to using \TeX}
\begin{itemize}
 \setlength{\itemsep}{2ex}
 \item I've heard \TeX\ and \LaTeX\ are not WYSIWYG\\
 \onslide<2-> {{\color{BrickRed} \TeX\ is a mark-up language}}

 \item \LaTeX\ is not installed on my computer\\
 \onslide<3-> {{\color{BrickRed} ProText, \TeX Live, \TeX Shop}}

 \item I don't know who to ask for help\\
 \onslide<4-> {{\color{BrickRed} \TeX\ Users Group -- {\tt www.tug.org}\\
              News group -- {\tt comp.text.tex}\\
              Google search}}
\end{itemize}
\end{frame}
```

Versions of `onslide`

`onslide` Hidden behavior depends on `\setbeamercovered{...}`

`onslide+` Hidden text is always invisible

`onslide*` Slide is typeset as if hidden text was not present

Example: list with `onslide+`

- I've heard TEX and LATEX are not WYSIWYG
- LATEX is not installed on my computer
- I don't know who to ask for help

Example: list with `onslide+`

- I've heard TeX and LaTeX are not WYSIWYG
  TeX is a mark-up language
- LaTeX is not installed on my computer
- I don't know who to ask for help

Example: list with `onslide+`

- I've heard TeX and LaTeX are not WYSIWYG
  TeX is a mark-up language
- LaTeX is not installed on my computer
  ProText, TeXLive, TeXShop
- I don't know who to ask for help

Example: list with `onslide+`

- I've heard TeX and LaTeX are not WYSIWYG
  TeX is a mark-up language
- LaTeX is not installed on my computer
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  TeX Users Group – `www.tug.org`
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  Google search

Example: list with `onslide*`

- I've heard TeX and LaTeX are not WYSIWYG
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Example: list with `onslide*`

- I've heard TeX and LaTeX are not WYSIWYG
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Example: list with `onslide*`

- I've heard TeX and LaTeX are not WYSIWYG
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Example: list with `onslide*`

- I've heard TeX and LaTeX are not WYSIWYG
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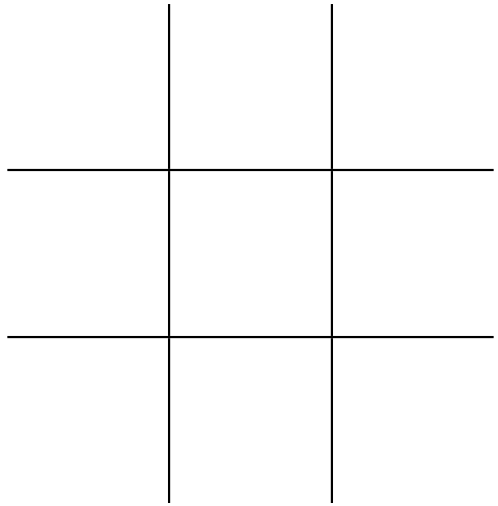
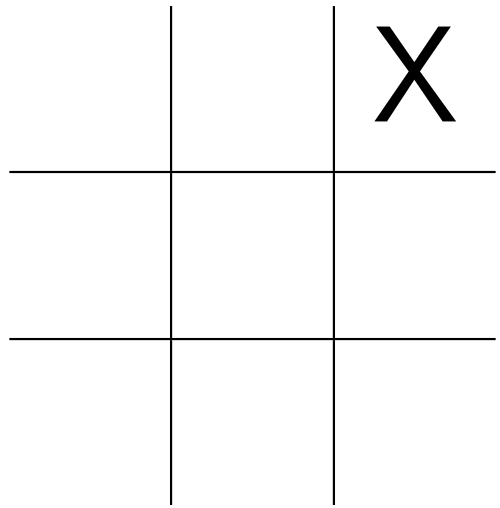
Overlay specifications

- Overlays are numbered $1, 2, 3, \ldots, N$
- An overlay specification defines a sequence of numbers
- Examples:
  - `<2>`
  - `<2-4>`
  - `<2->`
  - `<1,3,5,7,9>`
  - `<-3,8->`
- Some LaTeX commands can accept an overlay specification
  - `\textbf<2->{bold text}`
  - `\emph<3,5>{emphasized text}`
  - `{\color<4>{RoyalBlue} blue}`

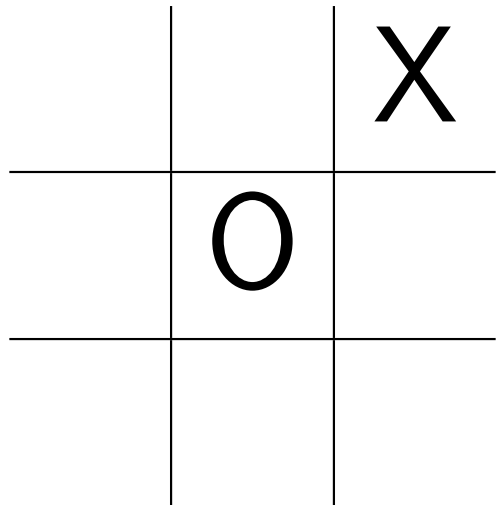
Tic-tac-toe via `tabular`



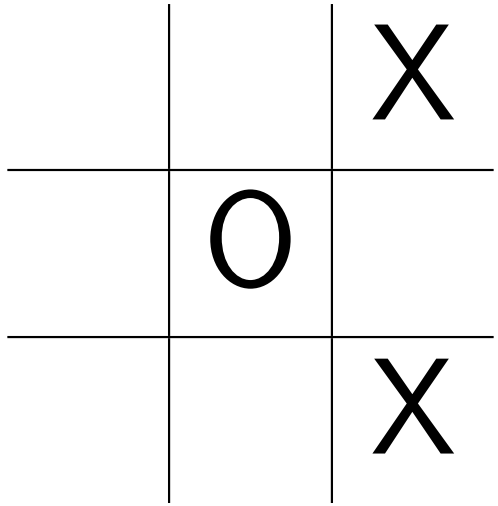
Tic-tac-toe via `tabular`



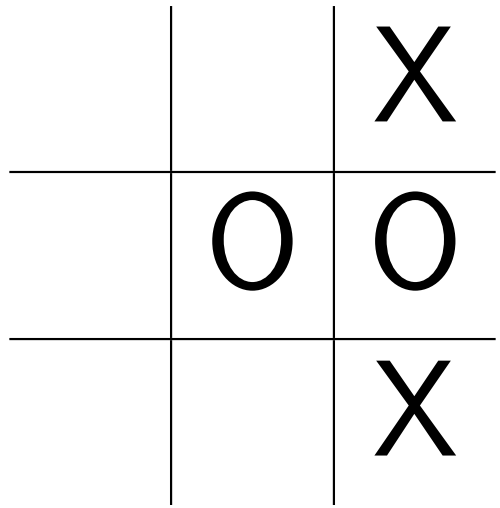
Tic-tac-toe via `tabular`



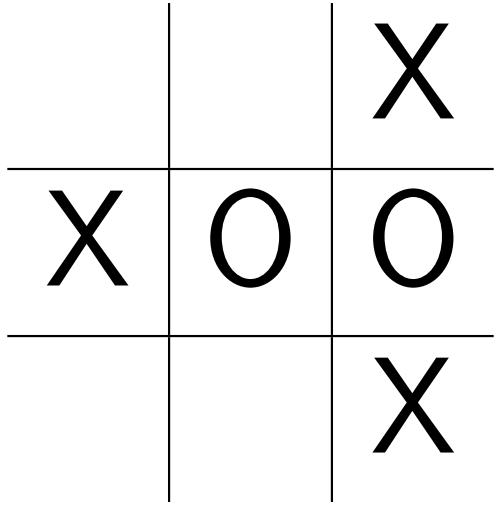
Tic-tac-toe via `tabular`



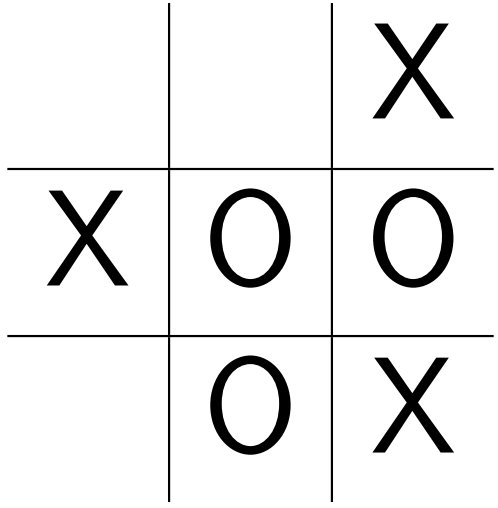
Tic-tac-toe via `tabular`



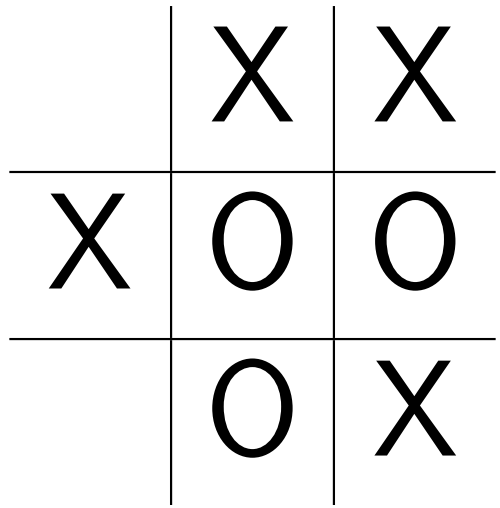
Tic-tac-toe via `tabular`



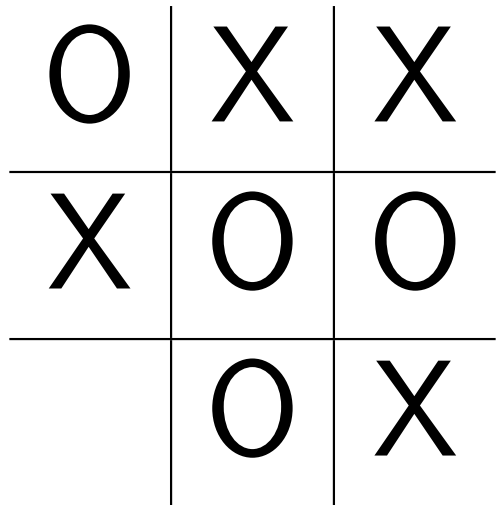
Tic-tac-toe via `tabular`



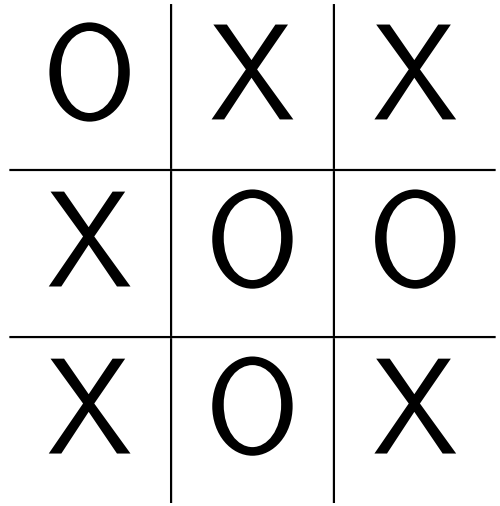
Tic-tac-toe via `tabular`



Tic-tac-toe via `tabular`



Tic-tac-toe via `tabular`



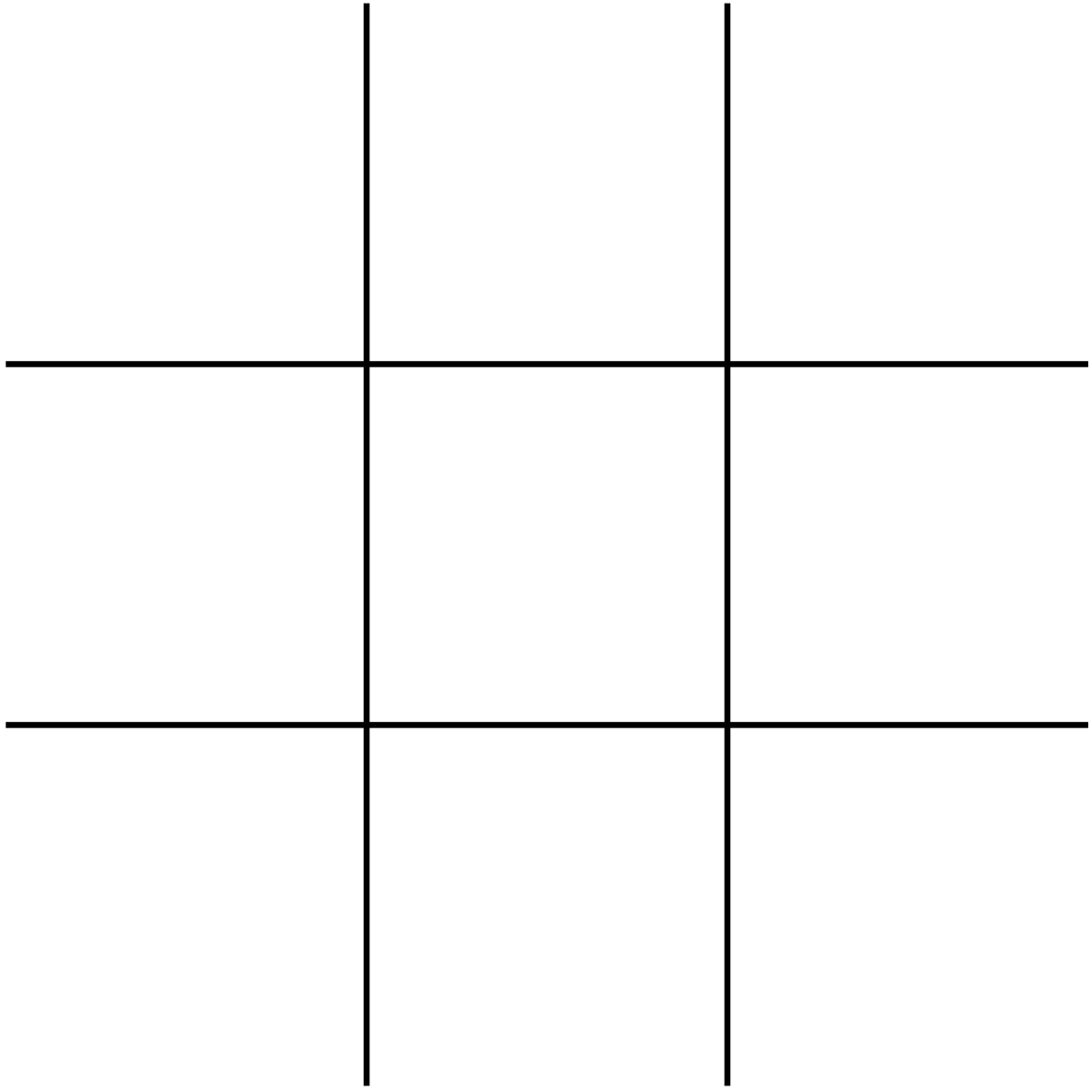
Example: tic-tac-toe via tabular

```
\begin{frame}
\frametitle{Tic-tac-toe via {\tt tabular}}

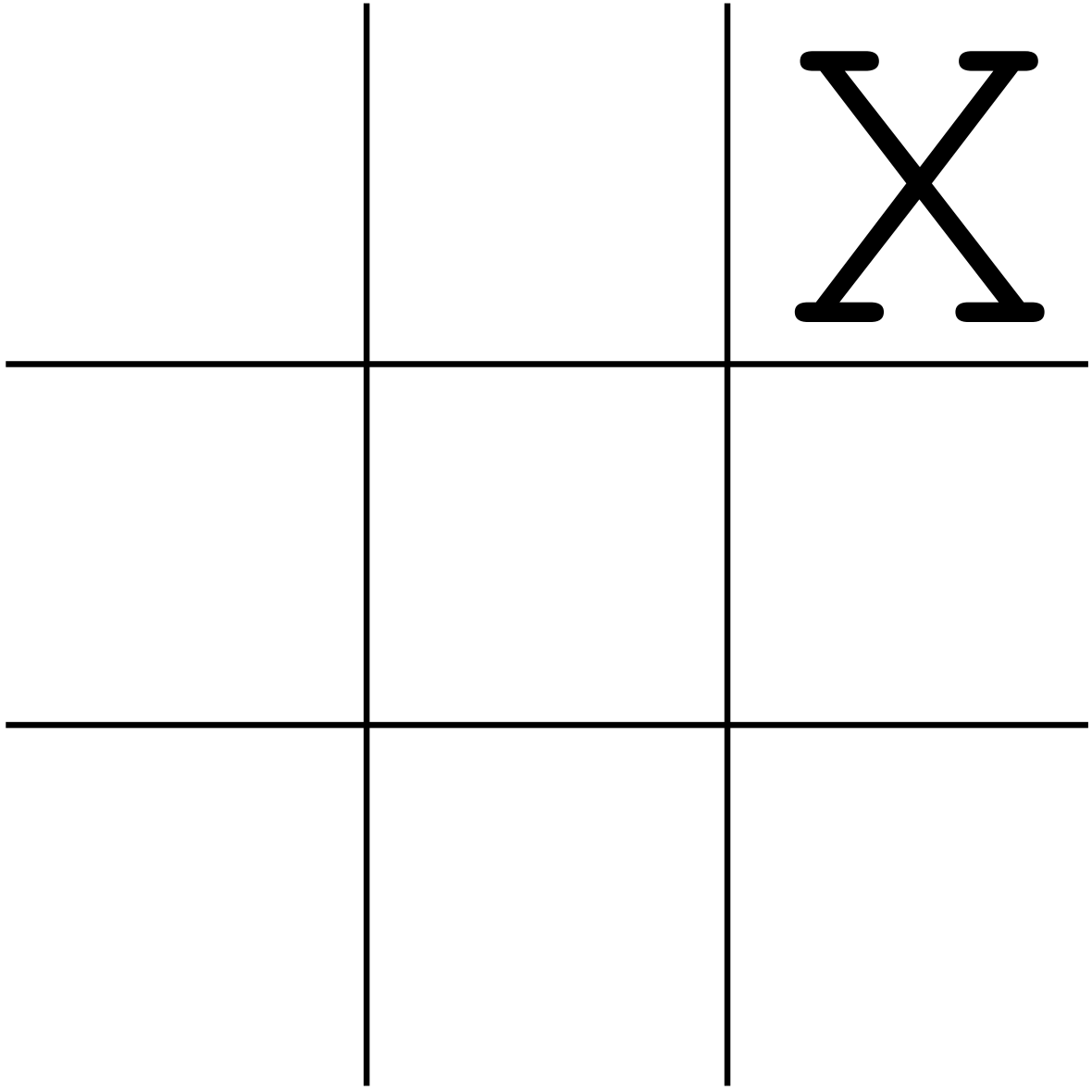
\setbeamercovered{invisible}
{\Huge
\begin{center}
  \begin{tabular}{c|c|c}
   \onslide<9->{O}  & \onslide<8->{X} & \onslide<2->{X} \\ \hline
   \onslide<6->{X}  & \onslide<3->{O} & \onslide<5->{O} \\ \hline
   \onslide<10->{X} & \onslide<7->{O} & \onslide<4->{X}
  \end{tabular}
\end{center}
}

\end{frame}
```

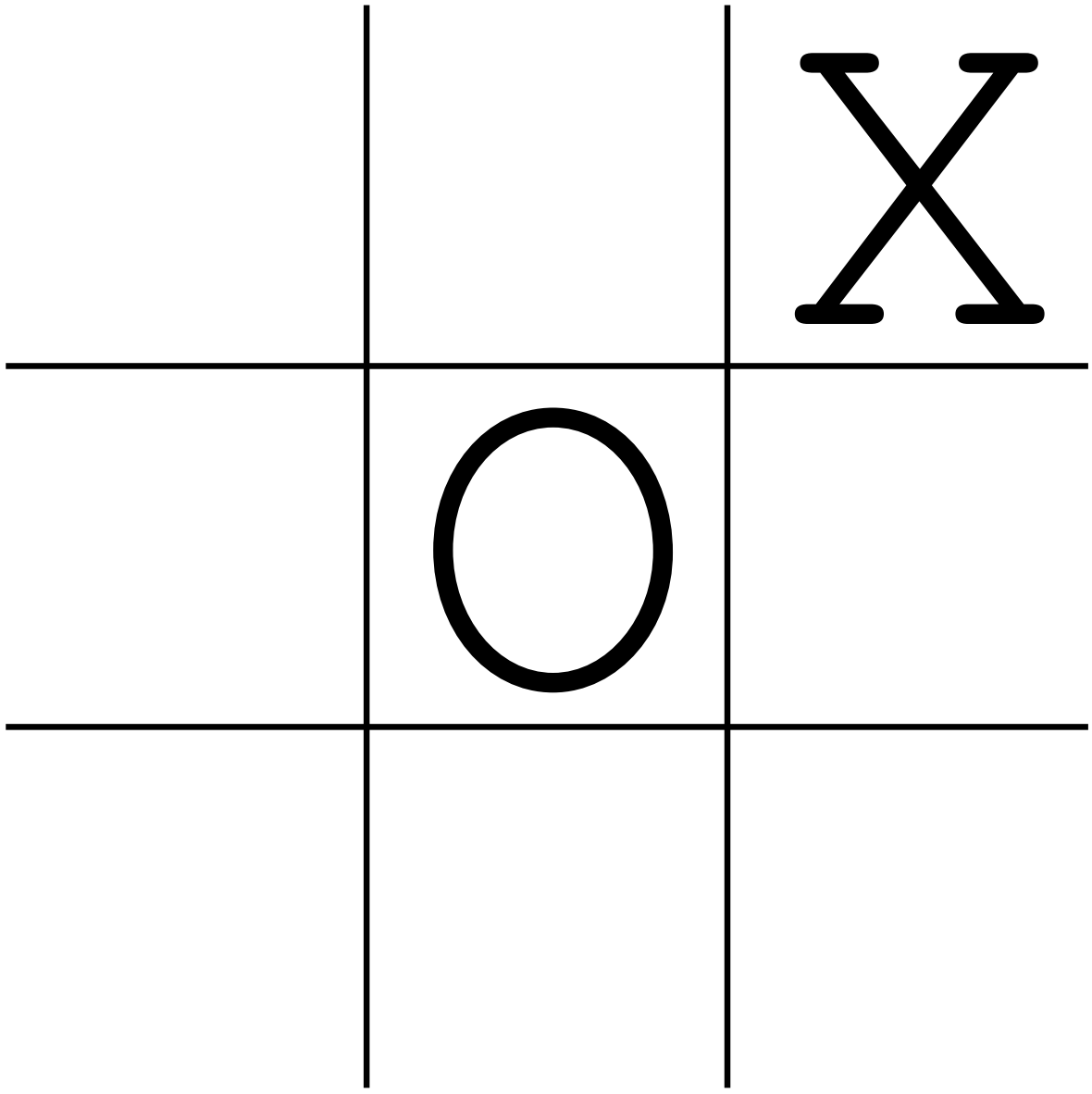
Tic-tac-toe via multiple graphics files



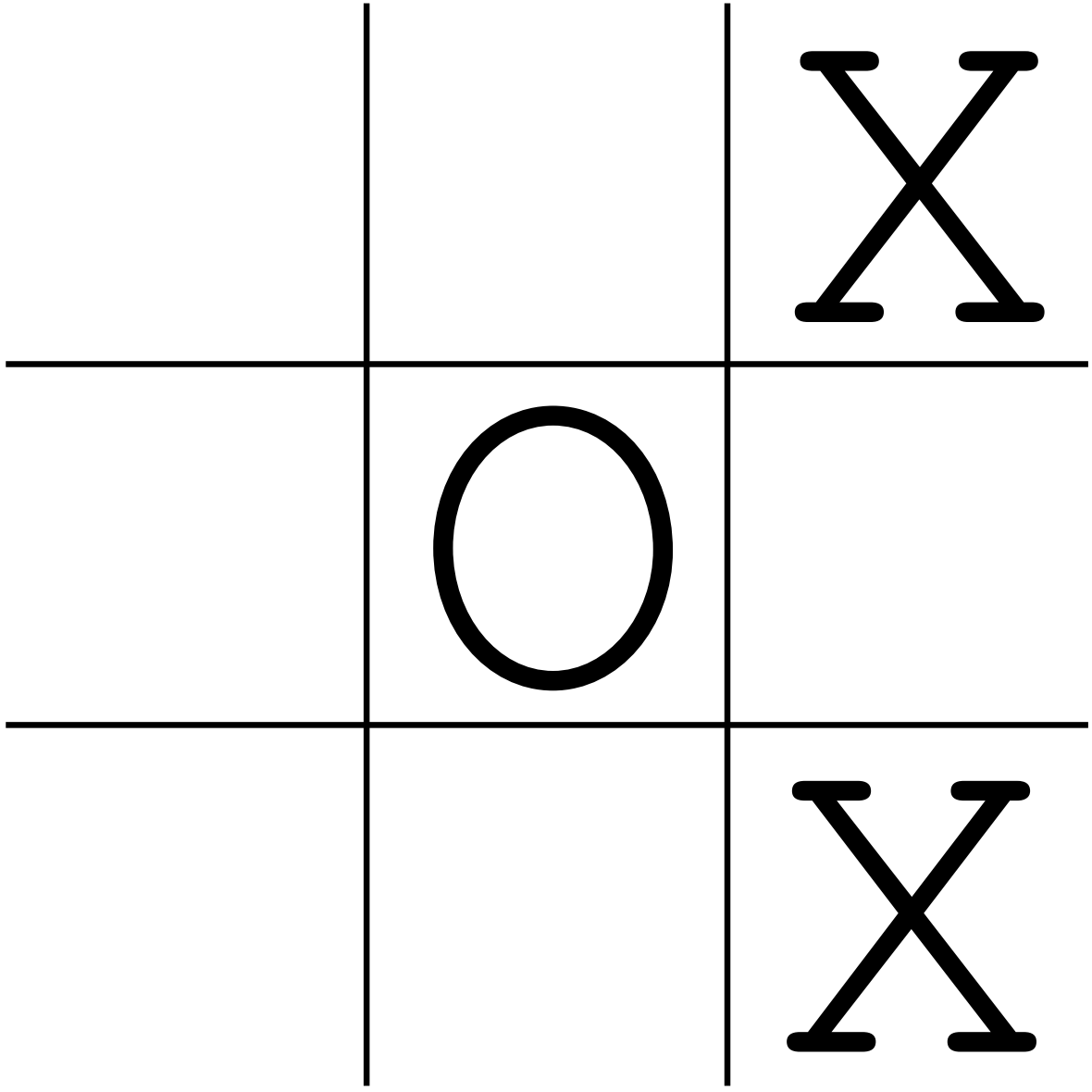
Tic-tac-toe via multiple graphics files



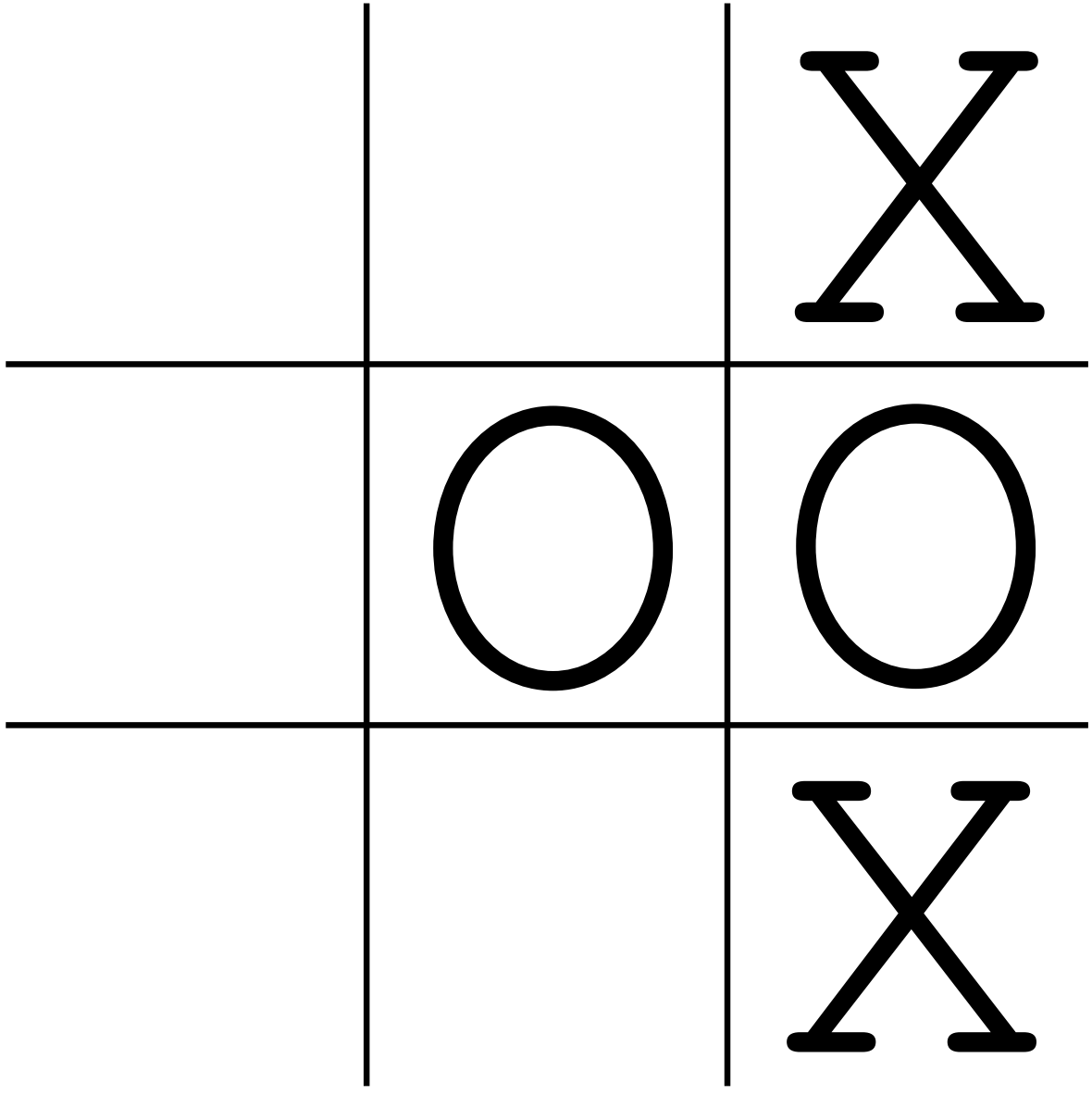
Tic-tac-toe via multiple graphics files



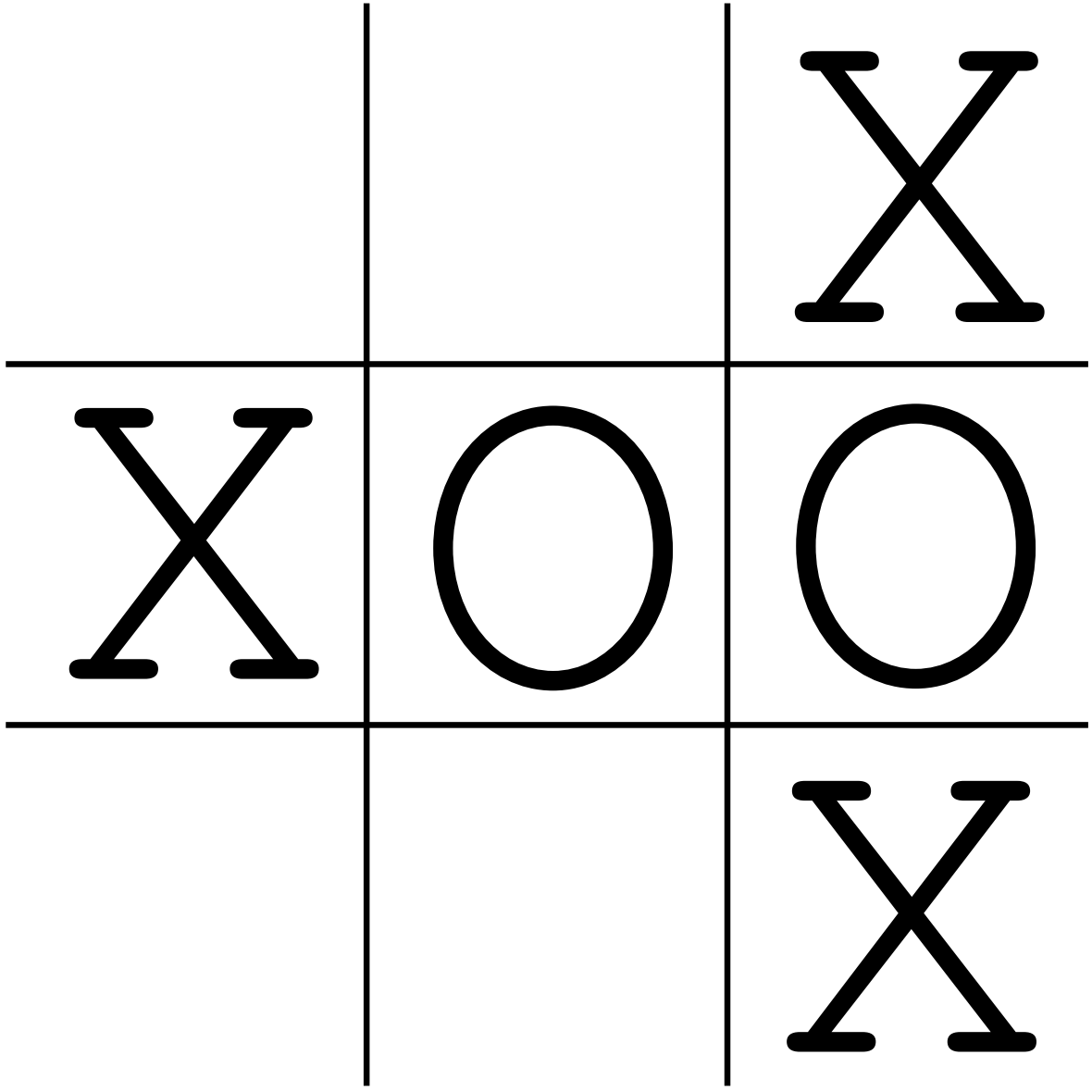
Tic-tac-toe via multiple graphics files



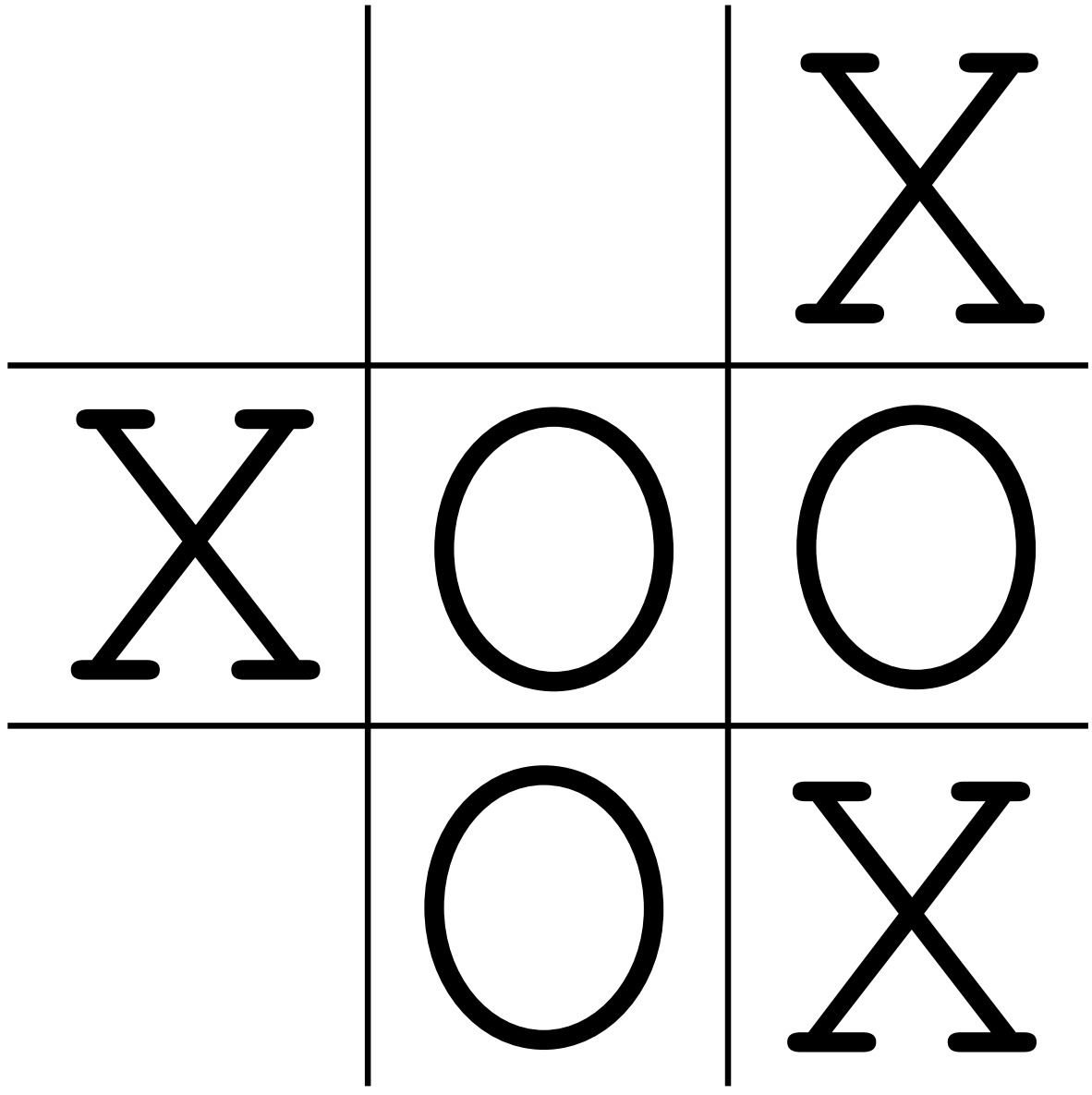
Tic-tac-toe via multiple graphics files



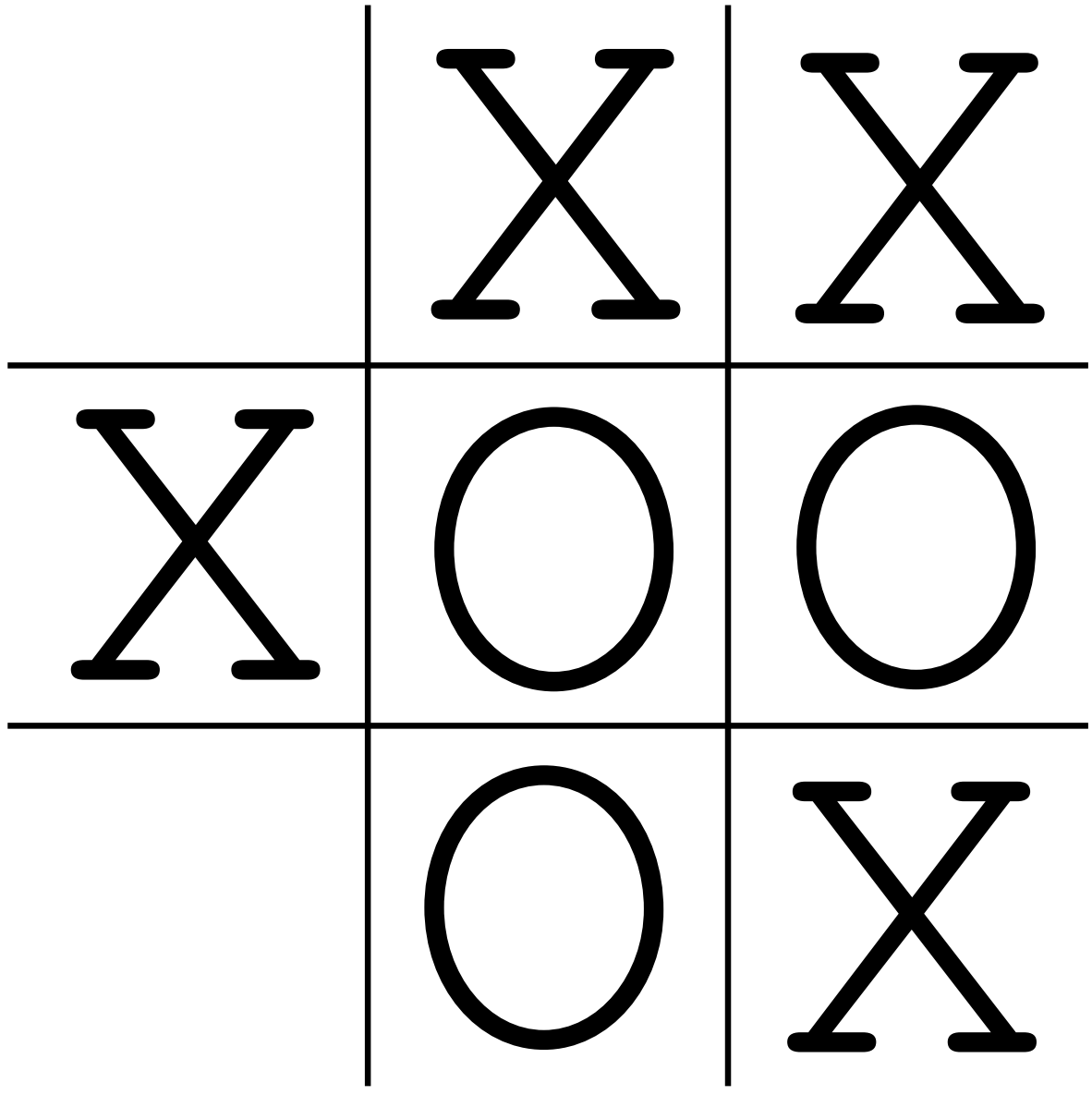
Tic-tac-toe via multiple graphics files



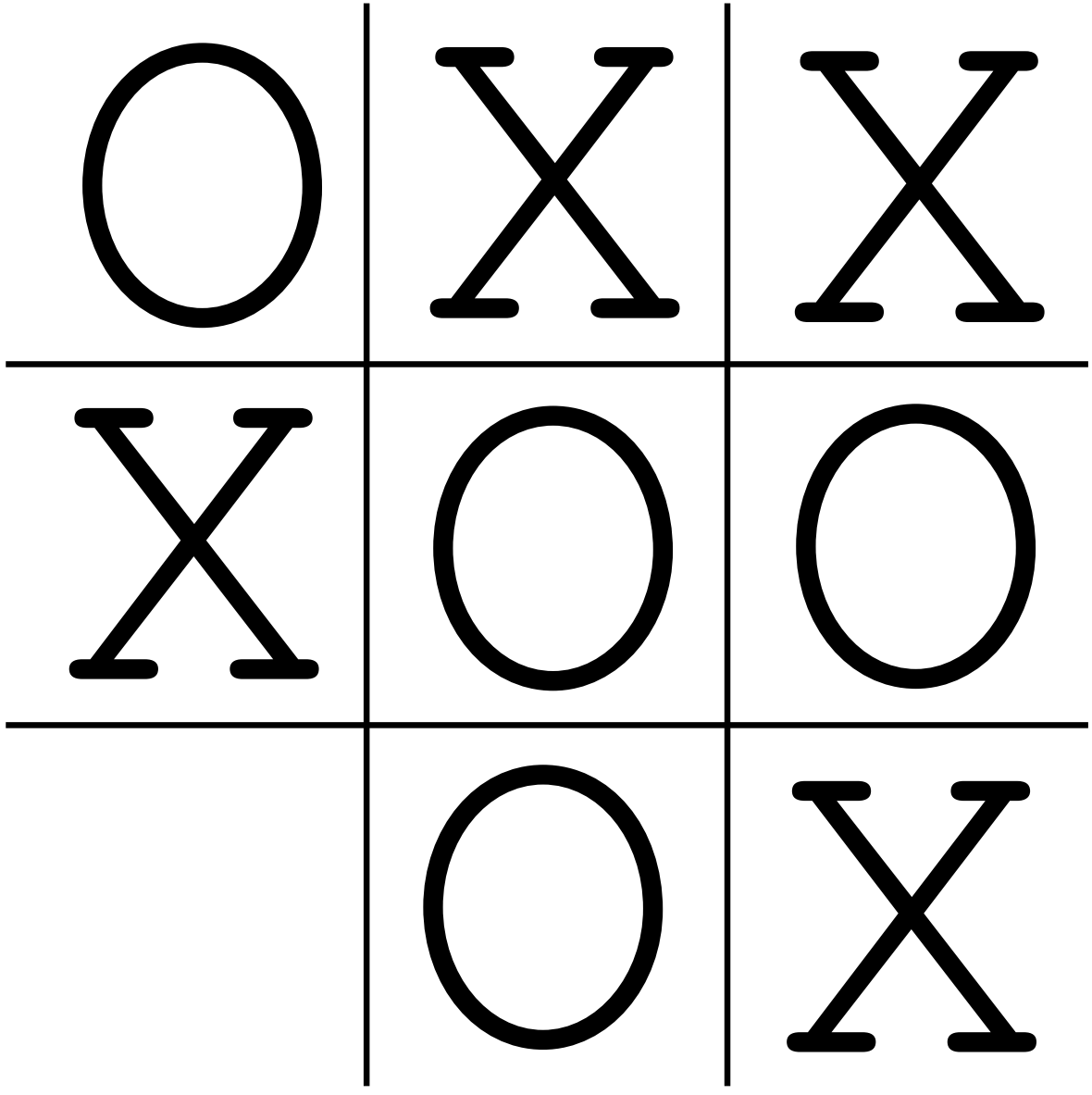
Tic-tac-toe via multiple graphics files



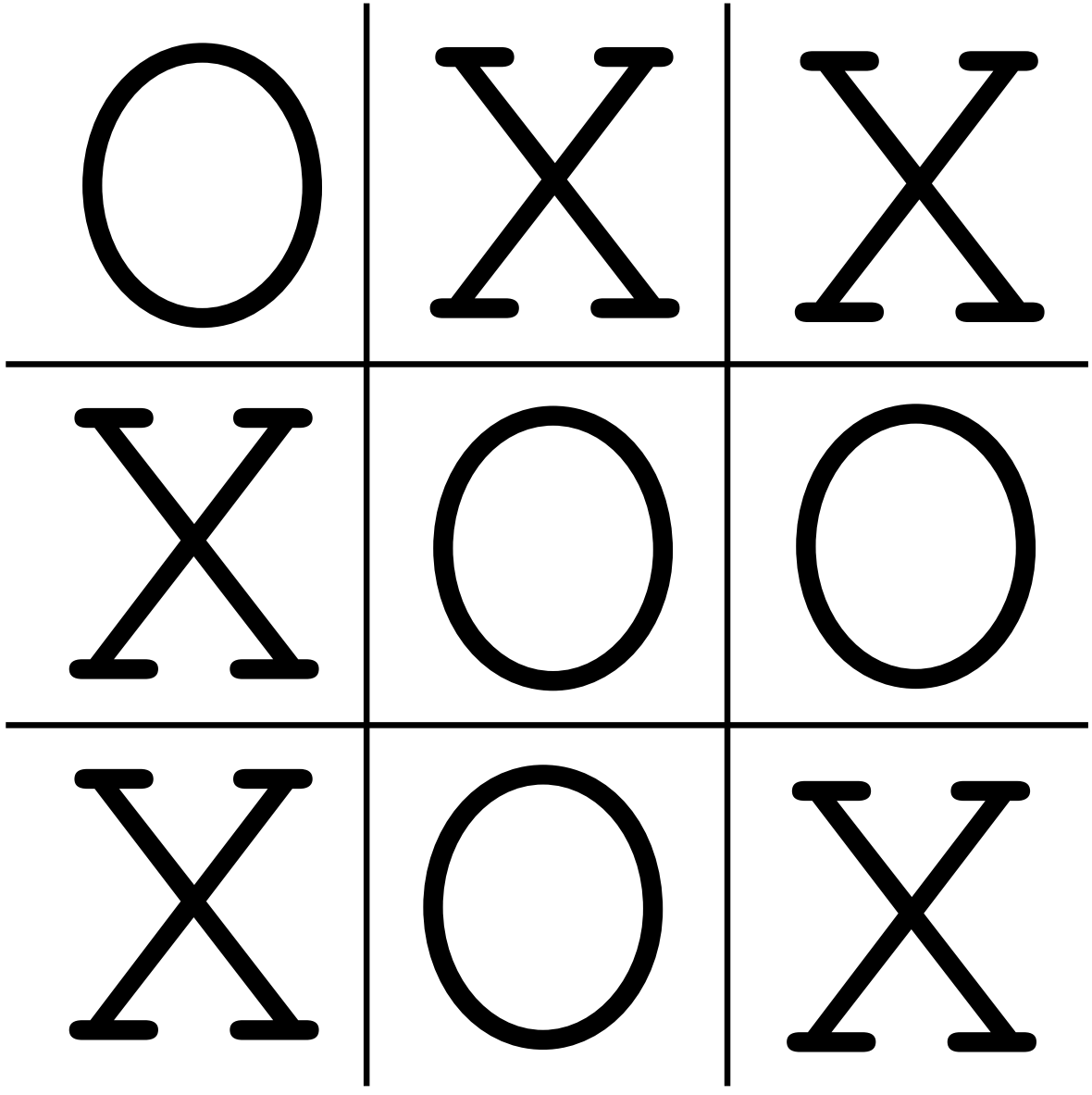
Tic-tac-toe via multiple graphics files



Tic-tac-toe via multiple graphics files



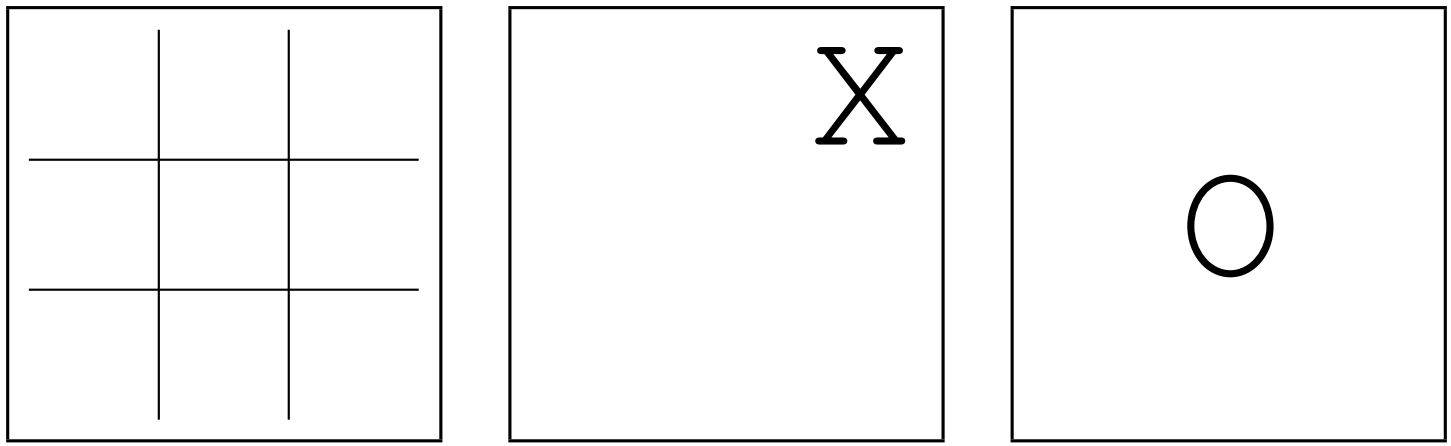
Tic-tac-toe via multiple graphics files



Example: multiple graphics files

```
\usepackage{xmpmulti}
  ...
\begin{frame}
\frametitle{Tic-tac-toe via multiple graphics files}

\setbeamercovered{invisible}
\begin{center}
  \multiinclude[format=pdf,graphics={width=3in}]{game}
\end{center}
\end{frame}
```



game-0.pdf game-1.pdf game-2.pdf

Highlighting items of a list

- Practical
- TEX
- 2005

Highlighting items of a list

- Practical
- TEX
- 2005

Highlighting items of a list

- Practical
- TEX
- 2005

Example: multiple overlay specifications

```
\begin{frame}
\frametitle{Highlighting items of a list}

\setbeamercovered{dynamic}
\begin{itemize}
  \setlength{\itemsep}{2ex}
  \item<1-> {\color<1>{BrickRed} Practical}
  \item<2-> {\color<2>{BrickRed} \TeX}
  \item<3-> {\color<3>{BrickRed} 2005}
\end{itemize}

\end{frame}
```

Other themes

- The Beamer package supplies many themes
- For example, place the following in the preamble:

```
\usepackage{beamerthemesplit}
\usetheme{Berkeley}
\usecolortheme{dolphin}
```

Beamer by Example

Andrew Mertz
William Slough

Mathematics and Computer Science Department
Eastern Illinois University

June 15, 2005

Overview

- Benefits of Using Beamer
- Examples
  - A tiny example
  - Basic frame ingredients

    `\begin{frame}`, `\frametitle`, `\end{frame}`
  - Static frame contents
    - Lists, mathematics, tables, verbatim text, graphics
    - Colors and tables via `xcolor`
    - Two columns
  - Incremental frame contents
    - Tables and lists with `\pause`
    - Lists with `\onslide`
    - Tic-tac-toe with `\onslide` and multiple graphics files
    - Highlighting items of a list
- Ornaments: Fonts and Themes
- Producing *N*-up output with `pdfjam` and `pdfpages`
- Pitfalls
- References

Handouts, pdfjam, and pdfpages

- Beamer output can be created without overlay effects:

```
\documentclass[handout,xcolor=pdftex,dvipsnames,table]{beamer}
```

- Placing `handout:0` in an overlay specification prevents the affected text from appearing on handouts. For example,

```
2 + 2 = \onslide+<2- | handout:0>{4}$
```

$$2 + 2 =$$

- The pdfpages package can be used to generate an N-up version from an overlay-free presentation

- pdfjam is a Unix shell script to automate the use of pdfpages

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```

$$2 + 2 = 4$$

- The pdfpages package can be used to generate an N-up version from an overlay-free presentation

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Pitfalls

- Beamer's `verbatim` environment
- Multiple processing steps
- Switching themes after content is established
- Frame numbering
- Temptation to exert fine control

Credits and acknowledgments

`beamer`	Till Tantau
`mpmulti`	Klaus Guntermann
`pdfjam`	David Firth
`pdfpages`	Andreas Matthias
`xcolor`	Uwe Kern

References

- Beamer: latex-beamer.sourceforge.net
- TEX Live: www.tug.org/texlive/
- TEX Shop: www.uoregon.edu/~koch/texshop/texshop.html
- ProTEXt : www.tug.org/protext/
- pdfpages: www.ctan.org/tex-archive/help/Catalogue/entries/pdfpages.html
- pdfjam: www2.warwick.ac.uk/fac/sci/statistics/staff/academic/firth/software/pdfjam