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TIMEZOOM: A FLEXIBLE DETAIL AND CONTEXT TIMELINE



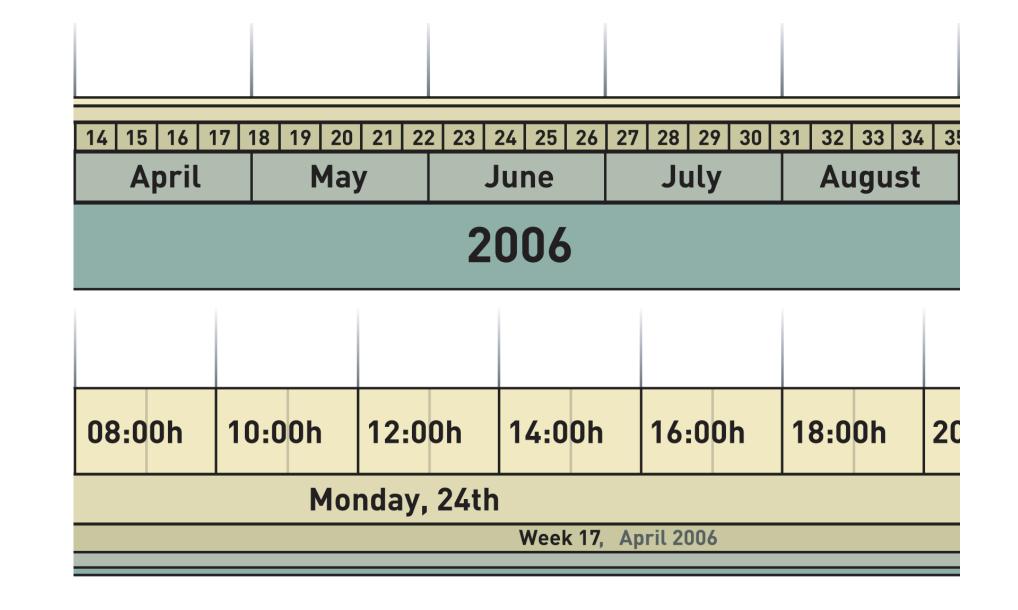
Abstract

TimeZoom is an interactive timeline widget to be combined with a tabular display of data in calendar, e-mail, project planning, or other applications. Different time levels are vertically stacked and can be smoothly zoomed, permitting arbitrary granularity of time units. In addition, single or multiple focus regions with various levels of detail can be defined to allow the display and comparison of time-dependent data, while preserving the overall context.

Motivation

As the primary attribute of e-mails, tasks and appointments, time plays a crucial role in desktop applications (e-mail clients, calendars, project planning software), media production tools and other applications. Therefore, powerful time navigation techniques are crucial where data is inherently coupled with time.

The required granularity of time (i.e. time unit) can differ considerably. This implicates both precise control and high-level overviews of time-variant data.

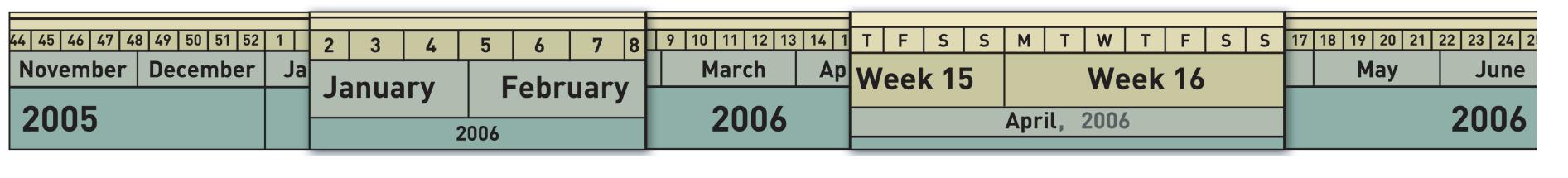


Conception and design of TimeZoom

TimeZoom is realized as a horizontal timeline along one screen dimension. It supports displaying multiple levels of granularity as well as regions of focus from a single unified and scrollable view. TimeZoom by itself does not visualize data, but provides a flexible spatial reference system for time-related data.

Basic design and timeline levels

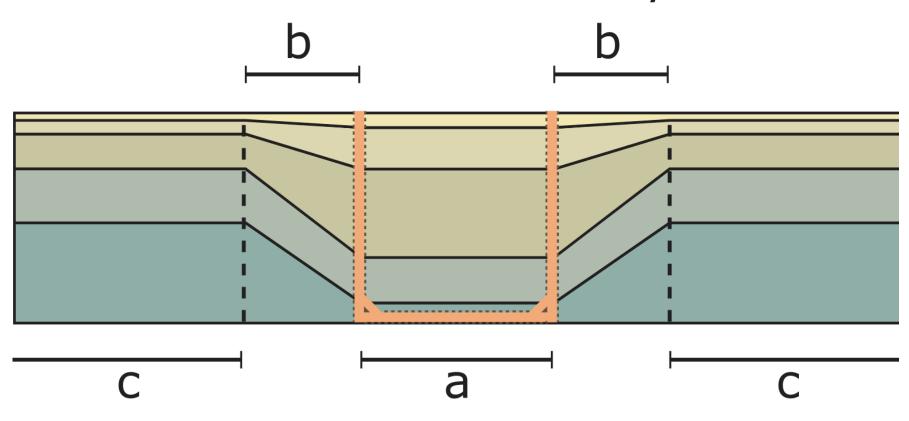
Time is measured in hierarchically contained units such as hours, days, and weeks. TimeZoom visualizes this as a set of levels representing a time unit. They are rendered as flat rectangles of diffe-



Shortcomings of multiple discrete views

- Views are discrete and fixed, thus they are bound to one specific LOD and have a static size.
- High-level views hide too much data, whereas detailed views suffer from lack of context and orientation.
- Scalability is not supported, e.g. for mobile devices.
- Missing support for high-detail or focus areas within coarser time view.
- Additional cognitive efforts for reinterpretation and orientation due to missing smooth transition between views.
- Display of absolute time is missing.

rent heights in a vertical stack, starting with the coarsest time unit at the bottom up to the finest unit on top. TimeZoom furthermore introduces the notion of weighted level heights or a vertical fisheye effect. To achieve a consistent height and to display all levels at the same time, the vertical extent of each level is modified according to the currently focused time unit. This increase and decrease of all levels is smoothly animated.



Regions of focus

Time Zoom allows the definition of regions of focus (a). A region is a confined range of time with a zoom level independent of the overall timeline. Thus users are able to simultaneously obtain coarser or finer grained views with multiple areas of interest. Altering a region's zoom results in a break of continuity with respect to the unmodified surrounding timeline (c). TimeZoom thus offers a transitional zone (b) as a connector between a region and its surroundings. By altering the interpolation function applied to the transition zone, different lens types can be simulated.

Interacting with TimeZoom

- Horizontal scrolling by directly dragging the timeline or a focus region to the desired position.
- Discrete movements in time intervals by clicking on arrow buttons aside.
- Zooming by activating the time buttons, by continuous movement with a thumbwheel or by rotating a vertical mouse wheel. The additional +/- buttons offer small-scale incremental zooms.
- Creating, deleting, selecting, and modifying regions of focus is done with mouse clicks or mouse gestures.
- A selection widget allows for shifting regions and expanding or shrinking their size.

Major benefits are the single, unified and consistent view on various time levels as well as the idea of flexible focus regions with different levels of detail being smoothly integrated into the same view.

