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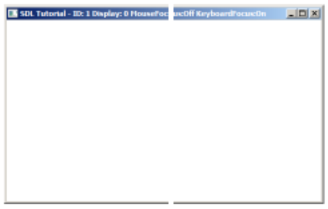
Multiple Displays


SDL Tutorial - ID: 1 Display: 0 MouseFocus:Off KeyboardFocus:On

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Another neat new feature with SDL 2 is the ability to handle multiple displays. Here we'll be making our window jump from display to display.

```
class LWindow
{
    public:
        //Intializes internals
        LWindow();

        //Creates window
        bool init();

        //Handles window events
        void handleEvent( SDL_Event& e );

        //Focuses on window
        void focus();

        //Shows windows contents
        void render();

        //Deallocates internals
        void free();

        //Window dimensions
        int getWidth();
        int getHeight();

        //Window focii
        bool hasMouseFocus();
        bool hasKeyboardFocus();
        bool isMinimized();
        bool isShown();

    private:
        //Window data
        SDL_Window* mWindow;
        SDL_Renderer* mRenderer;
        int mWindowID;
        int mWindowDisplayID;

        //Window dimensions
        int mWidth;
        int mHeight;

        //Window focus
        bool mMouseFocus;
        bool mKeyboardFocus;
        bool mFullScreen;
        bool mMinimized;
        bool mShown;
};
```

Here is our window from previous tutorials with a window display ID to keep track of which display the window is on.

```
//Our custom window
LWindow gWindow;

//Display data
int gTotalDisplays = 0;
SDL_Rect* gDisplayBounds = NULL;
```

Our displays all have a integer ID and a rectangle associated with them so we know the position and dimensions of each display on our desktop.

```
bool LWindow::init()
{
   //Create window
   mWindow = SDL_CreateWindow( "SDL Tutorial", SDL_WINDOWPOS_UNDEFINED, SDL_WINDOWPOS_UNDEFINED, SCREEN_WIDTH, SCREEN_HEIGHT, SDL_WINDOW_
   if( mWindow != NULL )
   {
      mMouseFocus = true;
      mKeyboardFocus = true;
      mWidth = SCREEN_WIDTH;
      mHeight = SCREEN_HEIGHT;

      //Create renderer for window
      mRenderer = SDL_CreateRenderer( mWindow, -1, SDL_RENDERER_ACCELERATED | SDL_RENDERER_PRESENTVSYNC );
      if( mRenderer == NULL )
      {
         printf( "Renderer could not be created! SDL Error: %s\n", SDL_GetError() );
         SDL_DestroyWindow( mWindow );
         mWindow = NULL;
      }
      else
      {
         //Initialize renderer color
         SDL_SetRenderDrawColor( mRenderer, 0xFF, 0xFF, 0xFF, 0xFF );

         //Grab window identifiers
         mWindowID = SDL_GetWindowID( mWindow );
         mWindowDisplayID = SDL_GetWindowDisplayIndex( mWindow );

         //Flag as opened
         mShown = true;
      }
   }
   else
   {
      printf( "Window could not be created! SDL Error: %s\n", SDL_GetError() );
   }

   return mWindow != NULL && mRenderer != NULL;
}
```

Our window creation code is pretty much the same as before only now we made a call to SDL_GetWindowDisplayIndex so we know which display the window was created on.

```
void LWindow::handleEvent( SDL_Event& e )
{
   //Caption update flag
   bool updateCaption = false;

   //If an event was detected for this window
   if( e.type == SDL_WINDOWEVENT && e.window.windowID == mWindowID )
   {
      switch( e.window.event )
      {
         //Window moved
         case SDL_WINDOWEVENT_MOVED:
         mWindowDisplayID = SDL_GetWindowDisplayIndex( mWindow );
         updateCaption = true;
         break;

         //Window appeared
         case SDL_WINDOWEVENT_SHOWN:
         mShown = true;
         break;

         //Window disappeared
         case SDL_WINDOWEVENT_HIDDEN:
         mShown = false;
         break;

         //Get new dimensions and repaint
         case SDL_WINDOWEVENT_SIZE_CHANGED:
         mWidth = e.window.data1;
         mHeight = e.window.data2;
         SDL_RenderPresent( mRenderer );
         break;

         //Repaint on expose
         case SDL_WINDOWEVENT_EXPOSED:
         SDL_RenderPresent( mRenderer );
         break;
```

```
            //Mouse enter
            case SDL_WINDOWEVENT_ENTER:
            mMouseFocus = true;
            updateCaption = true;
            break;

            //Mouse exit
            case SDL_WINDOWEVENT_LEAVE:
            mMouseFocus = false;
            updateCaption = true;
            break;

            //Keyboard focus gained
            case SDL_WINDOWEVENT_FOCUS_GAINED:
            mKeyboardFocus = true;
            updateCaption = true;
            break;

            //Keyboard focus lost
            case SDL_WINDOWEVENT_FOCUS_LOST:
            mKeyboardFocus = false;
            updateCaption = true;
            break;

            //Window minimized
            case SDL_WINDOWEVENT_MINIMIZED:
            mMinimized = true;
            break;

            //Window maxized
            case SDL_WINDOWEVENT_MAXIMIZED:
            mMinimized = false;
            break;

            //Window restored
            case SDL_WINDOWEVENT_RESTORED:
            mMinimized = false;
            break;

            //Hide on close
            case SDL_WINDOWEVENT_CLOSE:
            SDL_HideWindow( mWindow );
            break;
        }
    }
```

Here in our window's event handler we handle a SDL_WINDOWEVENT_MOVED event so we can update the display the window is on using SDL_GetWindowDisplayIndex.

```
    else if( e.type == SDL_KEYDOWN )
    {
        //Display change flag
        bool switchDisplay = false;

        //Cycle through displays on up/down
        switch( e.key.keysym.sym )
        {
            case SDLK_UP:
            ++mWindowDisplayID;
            switchDisplay = true;
            break;

            case SDLK_DOWN:
            --mWindowDisplayID;
            switchDisplay = true;
            break;
        }
```

When we press up or down we change the display index to move to the next display.

```
        //Display needs to be updated
        if( switchDisplay )
        {
            //Bound display index
            if( mWindowDisplayID < 0 )
            {
                mWindowDisplayID = gTotalDisplays - 1;
            }
            else if( mWindowDisplayID >= gTotalDisplays )
            {
                mWindowDisplayID = 0;
            }

            //Move window to center of next display
            SDL_SetWindowPosition( mWindow, gDisplayBounds[ mWindowDisplayID ].x + ( gDisplayBounds[ mWindowDisplayID ].w - mWidth ) / 2, gDisplayBounds[ mWi
            updateCaption = true;
        }
    }
    //Update window caption with new data
    if( updateCaption )
    {
        std::stringstream caption;
        caption << "SDL Tutorial - ID: " << mWindowID << " Display: " << mWindowDisplayID << " MouseFocus:" << ( ( mMouseFocus ) ? "On" : "Off" ) << " KeyboardFocus
        SDL_SetWindowTitle( mWindow, caption.str().c_str() );
    }
}
```

If we need to move to the next display, we first make sure the display is a valid index by bounding it. We then update the position of the window with SDL_SetWindowPosition. This call here will center the window in the next display.

```
bool init()
{
    //Initialization flag
    bool success = true;

    //Initialize SDL
    if( SDL_Init( SDL_INIT_VIDEO ) < 0 )
    {
        printf( "SDL could not initialize! SDL Error: %s\n", SDL_GetError() );
        success = false;
    }
    else
    {
        //Set texture filtering to linear
        if( !SDL_SetHint( SDL_HINT_RENDER_SCALE_QUALITY, "1" ) )
        {
            printf( "Warning: Linear texture filtering not enabled!" );
        }

        //Get number of displays
        gTotalDisplays = SDL_GetNumVideoDisplays();
        if( gTotalDisplays < 2 )
        {
            printf( "Warning: Only one display connected!" );
        }
```

In our initialization function we find out how many displays are connect to the computer using SDL_GetNumVideoDisplays. If there's only 1 display we output a warning.

```
        //Get bounds of each display
        gDisplayBounds = new SDL_Rect[ gTotalDisplays ];
        for( int i = 0; i < gTotalDisplays; ++i )
        {
            SDL_GetDisplayBounds( i, &gDisplayBounds[ i ] );
        }

        //Create window
        if( !gWindow.init() )
        {
            printf( "Window could not be created!\n" );
            success = false;
        }
    }

    return success;
}
```

Now that we know how many displays are connected, we allocate rectangles for each of them and get the bounds for each one using SDL_GetDisplayBounds. After this we initialize our window.

```
        //Main loop flag
        bool quit = false;

        //Event handler
        SDL_Event e;

        //While application is running
        while( !quit )
        {
            //Handle events on queue
            while( SDL_PollEvent( &e ) != 0 )
            {
                //User requests quit
                if( e.type == SDL_QUIT )
                {
                    quit = true;
                }

                //Handle window events
                gWindow.handleEvent( e );
            }

            //Update window
            gWindow.render();
        }
```

Since our code is well encapsulated the main loop hasn't changed since all the changes have happened under the hood.

Download the media and source code for this tutorial here.

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