Visualize Me

Explore the quickly updated world

Zining Wang @ Northeastern University

2025-04-04

EECE5642 Project Proposal

Outline

1. Project Information

1.1 Project Information

- Team Members & contributions:
  - Zining Wang: Idea, Design, Implementation and Presentation
- Used Language: elm-lang
- Source Code: https://github.com/wznmickey/visualizeMe
- Online Demo: https://wznmickey.github.io/visualizeMe/
- Data Source:
  - https://www.kaggle.com/datasets/michaelbryantds/cpu-and-gpu-product-data
  - https://llm-stats.com/

Current Appearance

1.2 Motivation

In today's fast-paced technological world, advancements in hardware and artificial intelligence (AI) are occurring at breakneck speed. This creates a dilemma for consumers and professionals who seek to stay up-to-date with the best performing systems without breaking the bank. While tools for benchmarking hardware, particularly CPUs and GPUs, have become increasingly sophisticated, the problem lies in the fact that top-tier performance is not necessarily the most cost-effective solution for everyone.

When selecting hardware, it's important to recognize that performance should not be the only consideration. Several other factors play a crucial role in choosing the right setup for a given application.

1.2 Motivation

- Power Consumption: While higher performance often correlates with higher power requirements, a balance must be struck to avoid excessive energy costs or hardware overheating.
- Price: The most powerful hardware often comes with a premium price tag, but for many users, the best performance is not required for their daily tasks. For example, a developer or gamer may need just enough GPU power to run programs efficiently, but not necessarily the highest-end models available.

1.2 Motivation

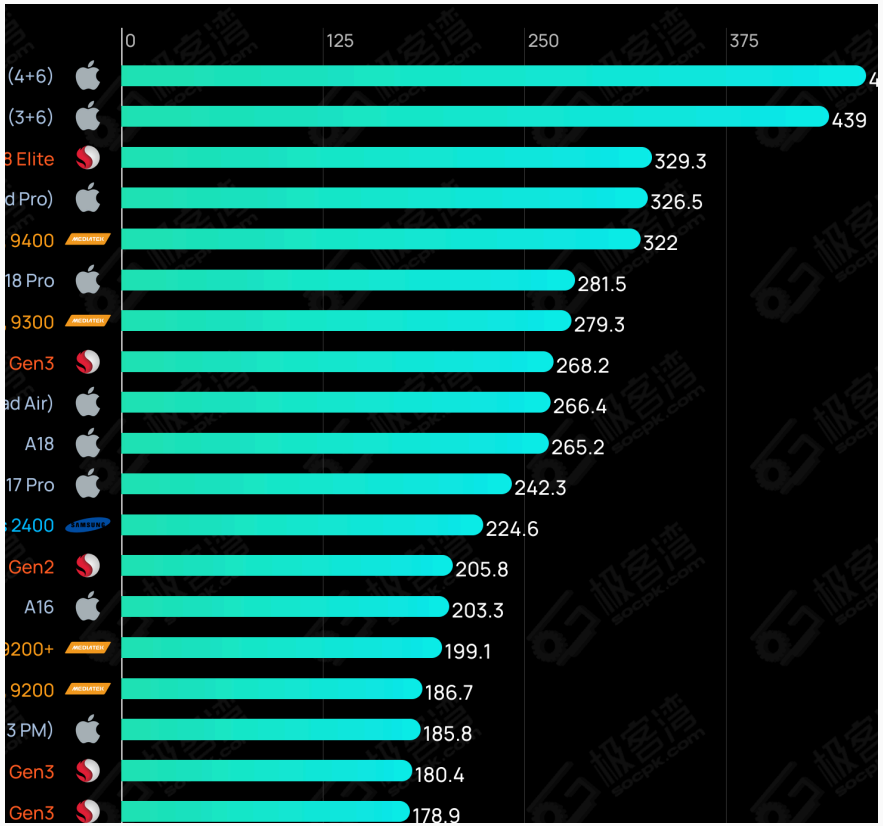
- Specific Use Case: Different use cases demand different hardware characteristics.
  - Single-core performance might be essential for applications that rely heavily on sequential processing (e.g., certain older games or single-threaded applications).
  - Multi-core performance is critical for tasks like rendering, scientific computing, and modern gaming where parallel processing is leveraged.
  - For GPUs, some users prioritize high encoding and decoding ability for video production, while others might prefer high memory bandwidth for tasks such as gaming, machine learning, or 3D rendering.

In addition to hardware considerations, there are also other contexts in which performance must be evaluated. For instance, in the realm of Large Language Models (LLMs) and other AI models, the user's needs must be balanced across several dimensions. As LLMs continue to evolve, model size, accuracy, and processing speed are important factors to weigh. Some users may prioritize faster inference times, while others may be more concerned with the accuracy of the results. Additionally, some may be restricted by computational resources, thus requiring smaller models that can still offer competitive performance.

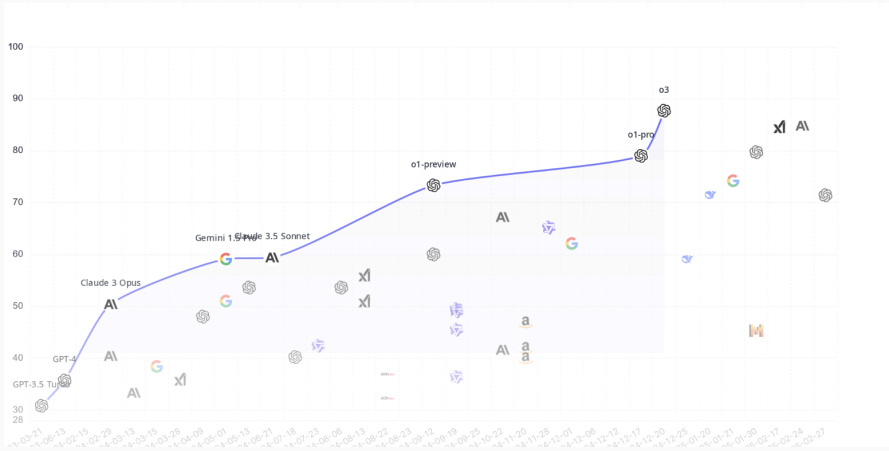
1.3 Current Situation

Hard to filter the desired parameters.

https://socpk.com/allperf/

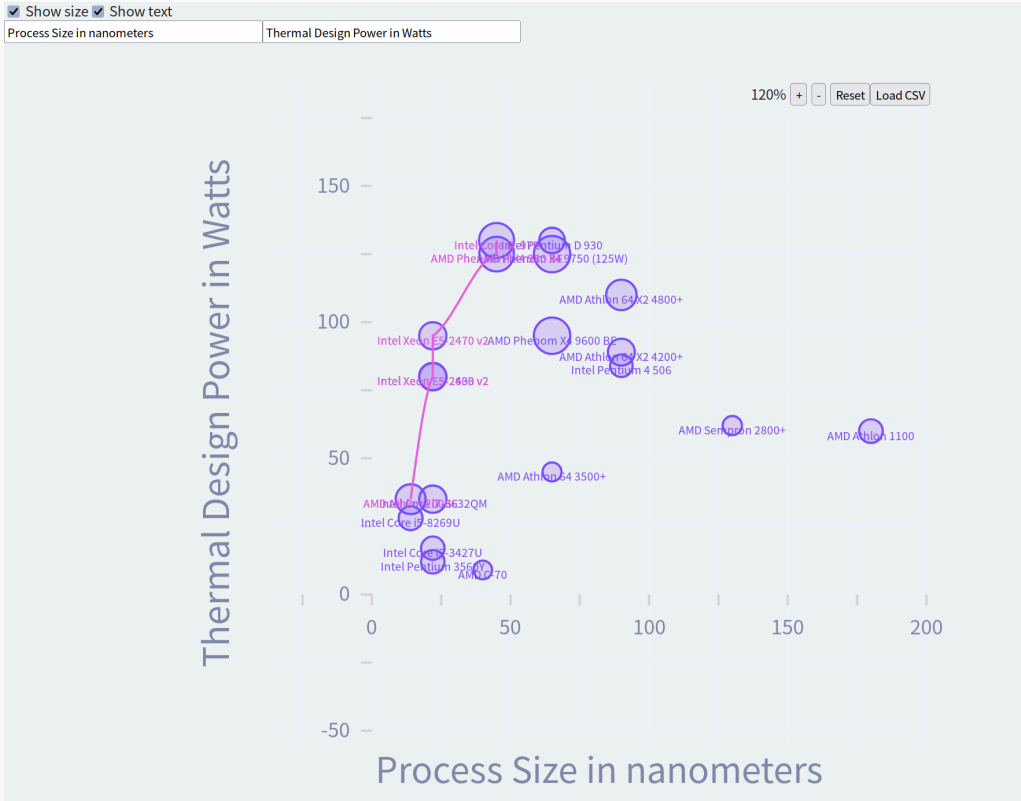


https://llm-stats.com/



2. Develop Process

To make the tool acessible to more people, I want to develop a web-based tool and I use elm-lang which is a functional programming language that could be compiled into a static HTML file with JavaScript containing SVG images which could be easily hosted on GitHub Pages service.



Current Appearance

2.2 Live Demo

https://wznmickey.github.io/visualizeMe/

1. Zoom in and out by pressing the button.
2. Reset the zoom by pressing the button.
3. Zoom in and out by the wheel. (Thanks to the suggestion that using the wheel to zoom in my proposal)
4. Move the plot by clicking the new center.
5. Drag the plot to move it. (Thanks to the suggestion that removing the $+$ line at the center of the screen in my proposal)
6. Switch on the text, size and the pareto line.
7. Upload the data and visualize it.
8. Change the x-axis, y-axis text.

2.3 Challenge

1. Lack of documentation and packages for elm-lang. e.g. csv parsing,key binding
2. Lack of contributor. I work alone in this project.
3. Lack of experience in web frontend development. I am not familiar with tools like CSS in organizing different elements in a page.

2.4 Current bugs & Undeveloped Part

There are some bugs in the current version:

- The text would not disappear when it is out of the screen.
- The size of each point could not resize according to the relative size of the data.
- Text may of x-axis and y-axis may be overlapped by the data point features.
- The layer of the element to capture wheel is lower than that of the element to show the data which causes the wheel event not captured in the center.

To-do:

- Filter different data columns in the csv file.
- When the mouse is moved onto each point, the text of the point should be shown.
- Better design of the layout of the page.

Developed For

computer DIY players

LLM local deployment users & researchers

People who have many options to choose from

https://wznmickey.github.io/visualizeMe/

3. Appendix

3.1 project Source Code

Main.elm

```elm
module Main exposing (..)

import Browser
import Zoom exposing (..)


main =
    Browser.element
        { init = init
        , view = view
        , update = update
        , subscriptions = \_ -> Sub.none
        }

```

Zoom.elm

```elm
module Zoom exposing (..)

import Chart as C
import Chart.Attributes as CA
import Chart.Events as CE
import Chart.Item as CI
import Chart.Svg as CS
import Csv.Decode as Decode exposing (Decoder, column, float, into, pipeline, string)
import File exposing (File)
import File.Select as Select
import Html as H exposing (Html, div)
import Html.Attributes as HA exposing (style)
import Html.Events as HE
```

3.1 project Source Code

```
14  import Html.Events.Extra.Wheel as Wheel
15  import Svg as S
16  import Svg.Attributes as SA
17  import Task
18
19
20  type alias Point =
21      { x : Float
22      , y : Float
23      , s : Float
24      , w : String
25      }
26
27
28  getPareto : List Point -> List Point
29  getPareto points =
30      let
31          sortedx =
32              List.sortBy .x points
33
34          paretoy =
35              List.foldl
36                  (\p acc ->
37                      if
38                          List.isEmpty acc
39                              || (case List.head acc of
40                                      Just headPoint ->
41                                          headPoint.y < p.y
42
43                                      Nothing ->
44                                          True
45                                  )
46                      then
47                          p :: acc
```

3.1 project Source Code

```
48
49                      else
50                          acc
51                  )
52                  []
53                  sortedx
54
55          -- Remove duplicates
56          pareto =
57              List.foldl
58                  (\p acc ->
59                      if
60                          List.isEmpty acc
61                              || (case List.head acc of
62                                      Just headPoint ->
63                                          headPoint.x /= p.x
64
65                                      Nothing ->
66                                          True
67                                  )
68                      then
69                          p :: acc
70
71                      else
72                          acc
73                  )
74                  []
75                  paretoy
76      in
77      List.reverse pareto
78
79
80  decoder : Decoder Point
81  decoder =
```

3.1 project Source Code

```
82      into Point
83          |> pipeline (column 1 float)
84          |> pipeline (column 2 float)
85          |> pipeline (column 3 float)
86          |> pipeline (column 0 string)
87
88
89  type alias Model =
90      { center : CS.Point
91      , dragging : Dragging
92      , percentage : Float
93      , data : List Point
94      , showSize : Bool
95      , showText : Bool
96      , showPareto : Bool
97      , textX : String
98      , textY : String
99      }
100
101
102 type Dragging
103     = CouldStillBeClick CS.Point
104     | ForSureDragging CS.Point
105     | None
106
107
108 init : () -> ( Model, Cmd Msg )
109 init _ =
110     ( { center = { x = 0, y = 0 }
111       , dragging = None
112       , percentage = 100
113       , data =
114             [ { x = 65, y = 45, s = 77, w = "AMD Athlon 64 3500+" }
115             , { x = 14, y = 35, s = 192, w = "AMD Athlon 200GE" }
```

3.1 project Source Code

```
116             , { x = 22, y = 80, s = 160, w = "Intel Xeon E5-2603 v2" }
117             , { x = 45, y = 125, s = 258, w = "AMD Phenom II X4 980 BE" }
118             , { x = 22, y = 95, s = 160, w = "\tIntel Xeon E5-2470 v2" }
119             ]
120       , showSize = True
121       , showText = True
122       , showPareto = False
123       , textX = "Process Size in nanometers"
124       , textY = "Thermal Design Power in Watts"
125       }
126     , Cmd.none
127     )
128
129
130 type Msg
131     = OnMouseMove CS.Point
132     | OnMouseDown CS.Point
133     | OnMouseUp CS.Point CS.Point
134     | OnMouseLeave
135     | OnZoomIn
136     | OnZoomOut
137     | OnZoomReset
138     | FileRequested
139     | FileUpload File
140     | FileLoad String
141     | ToggleShowSize
142     | ToggleShowText
143     | ToggleShowPareto
144     | OnWheelEvent Float
145     | UpdateTextX String
146     | UpdateTextY String
147
148
149 update : Msg -> Model -> ( Model, Cmd Msg )
```

3.1 project Source Code

```
150 update msg model =
151     case msg of
152         OnMouseDown offset ->
153             ( { model | dragging = CouldStillBeClick offset }, Cmd.none )
154 
155         OnMouseMove offset ->
156             case model.dragging of
157                 CouldStillBeClick prevOffset ->
158                     if prevOffset == offset then
159                         ( model, Cmd.none )
160 
161                     else
162                         ( { model
163                             | center = updateCenter model.center prevOffset offset
164                             , dragging = ForSureDragging offset
165                           }
166                         , Cmd.none
167                         )
168 
169                 ForSureDragging prevOffset ->
170                     ( { model
171                         | center = updateCenter model.center prevOffset offset
172                         , dragging = ForSureDragging offset
173                       }
174                     , Cmd.none
175                     )
176 
177                 None ->
178                     ( model, Cmd.none )
179 
180         OnMouseUp offset coord ->
181             case model.dragging of
182                 CouldStillBeClick prevOffset ->
183                     ( { model | center = coord, dragging = None }, Cmd.none )
```

3.1 project Source Code

```
184
185                 ForSureDragging prevOffset ->
186                     ( { model
187                         | center = updateCenter model.center prevOffset offset
188                         , dragging = None
189                       }
190                     , Cmd.none
191                     )
192
193                 None ->
194                     ( model, Cmd.none )
195
196         OnMouseLeave ->
197             ( { model | dragging = None }, Cmd.none )
198
199         OnZoomIn ->
200             ( { model | percentage = model.percentage + 20 }, Cmd.none )
201
202         OnZoomOut ->
203             ( { model | percentage = max 1 (model.percentage - 20) }, Cmd.none )
204
205         OnZoomReset ->
206             ( { model | percentage = 100, center = { x = 0, y = 0 } }, Cmd.none )
207
208         FileRequested ->
209             ( model
210             , Select.file [ "text/csv" ] FileUpload
211             )
212
213         FileUpload file ->
214             ( model, Task.perform FileLoad (File.toString file) )
215
216         FileLoad str ->
217             ( { model
```

3.1 project Source Code

```
218                | data =
219                    case
220                        Decode.decodeCsv Decode.NoFieldNames decoder str
221                    of
222                        Ok points ->
223                            points
224
225                        Err err ->
226                            []
227                }
228            , Cmd.none
229            )
230
231        ToggleShowSize ->
232            ( { model | showSize = not model.showSize }, Cmd.none )
233
234        ToggleShowText ->
235            ( { model | showText = not model.showText }, Cmd.none )
236
237        ToggleShowPareto ->
238            ( { model | showPareto = not model.showPareto }, Cmd.none )
239
240        OnWheelEvent delta ->
241            ( { model
242                | percentage =
243                    if delta > 0 then
244                        model.percentage + 20
245
246                    else
247                        max 1 (model.percentage - 20)
248                }
249            , Cmd.none
250            )
251
```

3.1 project Source Code

```
252         UpdateTextX text ->
253             ( { model | textX = text }, Cmd.none )
254
255         UpdateTextY text ->
256             ( { model | textY = text }, Cmd.none )
257
258
259 updateCenter : CS.Point -> CS.Point -> CS.Point -> CS.Point
260 updateCenter center prevOffset offset =
261     { x = center.x + (prevOffset.x - offset.x)
262     , y = center.y + (prevOffset.y - offset.y)
263     }
264
265
266 view : Model -> Html Msg
267 view model =
268     div []
269         [ div
270             [ style "position" "absolute" ]
271             [ div []
272                 [ H.label []
273                     [ H.input [ HA.type_ "checkbox", HA.checked model.showSize, HE.onClick ToggleShowSize ] []
274                     , H.text " Show size"
275                     ]
276                 , H.label []
277                     [ H.input [ HA.type_ "checkbox", HA.checked model.showText, HE.onClick ToggleShowText ] []
278                     , H.text " Show text"
279                     ]
280                 , H.label []
281                     [ H.input [ HA.type_ "checkbox", HA.checked model.showPareto, HE.onClick ToggleShowPareto ] []
282                     , H.text " Show pareto line"
283                     ]
284                 ]
285             , div []
```

3.1 project Source Code

```
286                 [ H.input
287                     [ HA.value model.textX
288                     , HE.onInput UpdateTextX
289                     ]
290                     []
291                 , H.input
292                     [ HA.value model.textY
293                     , HE.onInput UpdateTextY
294                     ]
295                     []
296                 ]
297             ]
298         , div
299             [ style "width" "100vw", style "height" "100vh", style "overflow" "hidden", Wheel.onWheel chooseZoom ]
300             []
301         , div
302             [ style "position" "absolute"
303             , style "top" "calc(50vh - 40vh)"
304             , style "left" "calc(50vw - 40vh)"
305             , style "width" "80vh"
306             , style "height" "80vh"
307             ]
308             [ C.chart
309                 [ CA.height 300
310                 , CA.width 300
311                 , CA.range [ CA.highest 300 CA.orHigher, CA.zoom model.percentage, CA.centerAt model.center.x ]
312                 , CA.domain [ CA.highest 300 CA.orHigher, CA.zoom model.percentage, CA.centerAt model.center.y ]
313                 , CE.onMouseDown OnMouseDown CE.getOffset
314                 , CE.onMouseMove OnMouseMove CE.getOffset
315                 , CE.on "mouseup" (CE.map2 OnMouseUp CE.getOffset CE.getCoords)
316                 , CE.onMouseLeave OnMouseLeave
317                 , CA.htmlAttrs
318                     [ HA.style "user-select" "none"
319                     , HA.style "cursor" <|
```

3.1 project Source Code

```
320                     case model.dragging of
321                         CouldStillBeClick _ ->
322                             "grabbing"
323
324                         ForSureDragging _ ->
325                             "grabbing"
326
327                         None ->
328                             "grab"
329                 ]
330             ]
331             [ C.xLabels [ CA.withGrid, CA.amount 5, CA.ints, CA.fontSize 9 ]
332             , C.yLabels [ CA.withGrid, CA.amount 5, CA.ints, CA.fontSize 9 ]
333             , C.xTicks [ CA.amount 10, CA.ints ]
334             , C.yTicks [ CA.amount 10, CA.ints ]
335             , C.labelAt CA.middle
336                 .min
337                 [ CA.moveDown 18 ]
338                 [ S.text model.textX ]
339             , C.labelAt .min
340                 CA.middle
341                 [ CA.moveLeft 18, CA.rotate 90 ]
342                 [ S.text model.textY ]
343             , C.series .x
344                 [ C.scatter .y [ CA.opacity 0.2, CA.borderWidth 1 ]
345                     |> C.variation
346                         (\_ d ->
347                             [ CA.size
348                                 (if model.showSize then
349                                     d.s * model.percentage / 100 / 10
350
351                                  else
352                                     1
353                                 )
```

3.1 project Source Code

```
354                             , CA.hideOverflow
355                             ]
356                         )
357                 ]
358                 model.data
359             , if model.showPareto then
360                 C.series .x
361                     [ C.interpolated .y [ CA.monotone ] []
362                     ]
363                     (getPareto model.data)
364
365               else
366                 C.series .x
367                     [ C.interpolated .y [ CA.monotone ] []
368                     ]
369                     []
370             , if model.showText then
371                 C.eachDot <|
372                     \p dot ->
373                         [ C.label
374                             [ CA.moveDown 4, CA.color (CI.getColor dot), CA.fontSize 5 ]
375                             [ S.text (CI.getData dot).w ]
376                             (CI.getCenter p dot)
377                         ]
378
379               else
380                 C.eachDot <|
381                     \_ _ ->
382                         []
383
384             -- C.eachDot <|
385             --     \p dot ->
386             --         [ C.label
387             --             [ CA.moveDown 4, CA.color (CI.getColor dot), CA.fontSize 5 ]
```

3.1 project Source Code

```
388                 --             [ S.text (CI.getData dot).w ]
389                 --             (CI.getCenter p dot)
390                 --         ]
391                 -- , C.withPlane <|
392                 --     \p ->
393                 --         [ C.line [ CA.color CA.darkGray, CA.dashed [ 6, 6 ], CA.y1 (CA.middle p.y) ]
394                 --         , C.line [ CA.color CA.darkGray, CA.dashed [ 6, 6 ], CA.x1 (CA.middle p.x) ]
395                 --         ]
396                 , C.htmlAt .max
397                     .max
398                     0
399                     0
400                     [ HA.style "transform" "translateX(-100%)" ]
401                     [ H.span
402                         [ HA.style "margin-right" "5px" ]
403                         [ H.text (String.fromFloat model.percentage ++ "%") ]
404                     , H.button
405                         [ HE.onClick OnZoomIn
406                         , HA.style "margin-right" "5px"
407                         ]
408                         [ H.text "+" ]
409                     , H.button
410                         [ HE.onClick OnZoomOut
411                         , HA.style "margin-right" "5px"
412                         ]
413                         [ H.text "-" ]
414                     , H.button
415                         [ HE.onClick OnZoomReset ]
416                         [ H.text "Reset" ]
417                     , H.button [ HE.onClick FileRequested ] [ H.text "Load CSV" ]
418                     ]
419                 ]
420             ]
421         ]
```

3.1 project Source Code

```
422
423
424 chooseZoom : Wheel.Event -> Msg
425 chooseZoom wheelEvent =
426     case wheelEvent of
427         event ->
428             OnWheelEvent event.deltaY
429
430
431 meta =
432     { category = "Interactivity"
433     , categoryOrder = 5
434     , name = "Zoom"
435     , description = "Add zoom effect."
436     , order = 20
437     }
438
```

3.2 slides Source Code

The typst code generating the slides. `main.typ`

typ

```
#import "@preview/touying:0.6.1": *
#import "@preview/pinit:0.2.0": *
#import themes.metropolis: *
#import "@preview/numbly:0.1.0": numbly
#import "@preview/codly:1.0.0": *

#show: codly-init.with()
#show: metropolis-theme.with(
  aspect-ratio: "16-9",
  footer: self => self.info.institution,
  config-info(
    title: [Visualize Me],
    subtitle: [Explore the quickly updated world],
    author: [Zining Wang \@ Northeastern University],
    date: datetime.today(),
    institution: [EECE5642 Project Proposal ],
  ),
)
#set heading(numbering: numbly("{1}.", default: "1.1"))
#title-slide()
= Outline <touying:hidden>

#outline(title: none, indent: 1em, depth: 2)
= Project Information
== Project Information
#grid(columns: 2)[
  - Team Members & contributions:
    - Zining Wang: Idea, Design, Implementation and Presentation

  - Used Language: elm-lang

```

3.2 slides Source Code

```
  - Source Code: https://github.com/wznmickey/visualizeMe

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][#grid(columns: 1, align: center)[#image("tempResult.png") ][
    Current Appearance]]

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In today's fast-paced technological world, advancements in hardware and artificial intelligence (AI) are occurring at breakneck speed. This creates a dilemma for consumers and professionals who seek to stay up-to-date with the best performing systems without breaking the bank. While tools for benchmarking hardware, particularly CPUs and GPUs, have become increasingly sophisticated, the problem lies in the fact that top-tier performance is not necessarily the most cost-effective solution for everyone.

When selecting hardware, it's important to recognize that performance should not be the only consideration. Several other factors play a crucial role in choosing the right setup for a given application.
#pagebreak()
- Power Consumption: While higher performance often correlates with higher power requirements, a balance must be struck to avoid excessive energy costs or hardware overheating.

- Price: The most powerful hardware often comes with a premium price tag, but for many users, the best performance is not required for their daily tasks. For example, a developer or gamer may need just enough GPU power to run programs efficiently, but not necessarily the highest-end models available.
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  - Single-core performance might be essential for applications that rely heavily on sequential processing (e.g., certain older games or single-threaded applications).

  - Multi-core performance is critical for tasks like rendering, scientific computing, and modern gaming where parallel processing is leveraged.

  - For GPUs, some users prioritize high encoding and decoding ability for video production, while others might prefer high memory bandwidth for tasks such as gaming, machine learning, or 3D rendering.
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```

3.2 slides Source Code

```
60
61  == Current Situation
62  Hard to filter the desired parameters.
63  #grid(columns: (1fr, 0.3fr, 1fr))[https://socpk.com/allperf/
64    #image("socpk.png", height: 80%)][][
65    https://llm-stats.com/
66    #image("LLM.png")
67  ]
68
69
70
71  = Develop Process
72
73  == Developed Part
74  #grid(columns: 2)[
75    To make the tool acessible to more people, I want to develop a web-based tool and I use elm-lang which is a functional programming language that could be compiled into a static HTML file with JavaScript containing SVG images which could be easily hosted on GitHub Pages service.
76  ][#grid(columns: 1, align: center)[#image("tempResult.png") ][
77      Current Appearance]]
78
79  == Live Demo
80
81  https://wznmickey.github.io/visualizeMe/
82
83
84  1. Zoom in and out by pressing the button.
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92
```

3.2 slides Source Code

```
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- Better design of the layout of the page.

#focus-slide[

  *Developed For*

  computer DIY players

  LLM local deployment users & researchers

  People who have many options to choose from

  https://wznmickey.github.io/visualizeMe/
]

= Appendix
```

3.2 slides Source Code

````
127
128 == project Source Code
129 `Main.elm`
130 #{
131   set text(size: 8pt)
132   let x = read("../src/Main.elm")
133   raw(x, block: true, lang: "elm")
134 }
135 `Zoom.elm`
136 #{
137   set text(size: 8pt)
138   let x = read("../src/Zoom.elm")
139   raw(x, block: true, lang: "elm")
140 }
141
142
143 == slides Source Code
144 The typst code generating the slides.
145 `main.typ`
146 #{
147   set text(size: 8pt)
148   let x = read("./main.typ")
149   raw(x, block: true, lang: "typ")
150 }
151
````