

Introduction to Computer Graphics and Visualization

By

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Line Drawing using `moveto()` and `lineto()`.

- `moveto(x, y)` set CP to (x, y)
- `lineto(x, y)` draw a line from CP to (x, y), and then update CP to (x, y)
- A line from (x1, y1) to (x2, y2) is therefore drawn using the two calls `moveto(x1, y1); lineto(x2, y2)`. A polyline based on the list of points (x0, y0), (x1, y1), ..., (xn-1, yn-1) is easily drawn
- `GLintPoint CP` // global current position

Source	Year	Age	Sex	Height (cm)	Weight (kg)	Body Mass Index (kg/m ²)	Waist Circumference (cm)	Waist-Hip Ratio	Trunk Fat (%)	Visceral Fat (cm)	Subcutaneous Fat (cm)	Visceral Fat Index (cm ³)	Subcutaneous Fat Index (cm ³)	Visceral Fat to Subcutaneous Fat Ratio
1	2000	25	M	175	75	24.5	95	0.85	15	10	5	150	250	0.6
2	2001	26	F	160	60	23.8	85	0.82	12	8	4	120	200	0.6
3	2002	27	M	180	80	25.9	100	0.88	18	12	6	180	300	0.6
4	2003	28	F	165	65	24.2	90	0.84	14	9	5	140	230	0.6
5	2004	29	M	170	70	24.2	92	0.86	16	11	5	160	260	0.6
6	2005	30	F	162	62	23.8	88	0.83	13	9	4	130	210	0.6
7	2006	31	M	178	78	24.1	98	0.87	17	13	6	170	290	0.6
8	2007	32	F	168	68	24.2	94	0.85	15	11	5	150	270	0.6
9	2008	33	M	182	82	25.0	102	0.89	19	14	7	190	320	0.6
10	2009	34	F	170	70	24.2	96	0.86	16	12	6	160	300	0.6
11	2010	35	M	185	85	24.9	105	0.90	20	15	8	200	350	0.6
12	2011	36	F	172	72	24.2	98	0.87	17	13	7	170	330	0.6
13	2012	37	M	188	88	24.9	108	0.91	21	16	9	210	380	0.6
14	2013	38	F	175	75	24.2	100	0.88	18	14	8	180	360	0.6
15	2014	39	M	190	90	24.9	110	0.92	22	17	10	220	400	0.6
16	2015	40	F	178	78	24.2	102	0.89	19	15	9	190	390	0.6
17	2016	41	M	192	92	24.9	112	0.93	23	18	11	230	420	0.6
18	2017	42	F	180	80	24.2	104	0.90	20	16	10	200	410	0.6
19	2018	43	M	195	95	24.9	115	0.94	24	19	12	240	450	0.6
20	2019	44	F	182	82	24.2	106	0.91	21	17	11	210	440	0.6
21	2020	45	M	198	98	24.9	118	0.95	25	20	13	250	480	0.6
22	2021	46	F	185	85	24.2	108	0.92	22	18	12	220	470	0.6
23	2022	47	M	200	100	24.9	120	0.96	26	21	14	260	500	0.6
24	2023	48	F	188	88	24.2	110	0.93	23	19	13	230	490	0.6
25	2024	49	M	202	102	24.9	122	0.97	27	22	15	270	520	0.6
26	2025	50	F	190	90	24.2	112	0.94	24	20	14	240	510	0.6
27	2026	51	M	205	105	24.9	125	0.98	28	23	16	280	550	0.6
28	2027	52	F	192	92	24.2	115	0.95	25	21	15	250	540	0.6
29	2028	53	M	208	108	24.9	128	0.99	29	24	17	290	58	

Practice Questions

- Drawing Aligned Rectangles
 - A special case of a polygon is the aligned rectangle, so called because its sides are aligned with the coordinate axes.
- Drawing the checkerboard.



Mouse interaction

- function `myMouse()` to take four parameters, so that it has the prototype:
 - `void myMouse(int button, int state, int x, int y);`
- Event occurs the system calls the registered function, supplying it with values for these parameters. The value of button will be one of:
 - `GLUT_LEFT_BUTTON`, `GLUT_MIDDLE_BUTTON`, or `GLUT_RIGHT_BUTTON`,

Example: Placing dots with the mouse

- Each time the user presses down the left mouse button a dot is drawn in the screen window at the mouse position. If the user presses the right button the program terminates.

```
void myMouse(int button, int state, int x, int y)
{
    if(button == GLUT_LEFT_BUTTON && state == GLUT_DOWN)
        drawDot(x, screenHeight - y);
    else if(button == GLUT_RIGHT_BUTTON && state == GLUT_DOWN)
        exit(-1);}
```

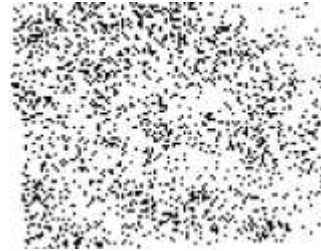
- the y-value of the mouse position is the number of pixels from the top of the screen window, we draw the dot, not at (x, y), but at (x, screenHeight - y), where screenHeight is assumed here to be the height of the window in pixels.

Practice Question

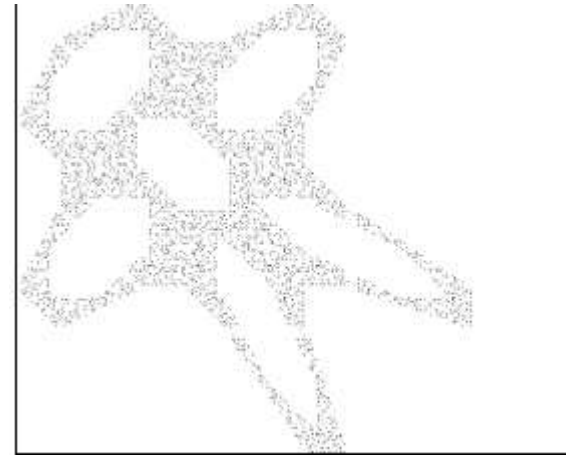
- Specifying a rectangle with the mouse
- Create a polyline using the mouse
- “Freehand” drawing with a fat brush***

Case Study

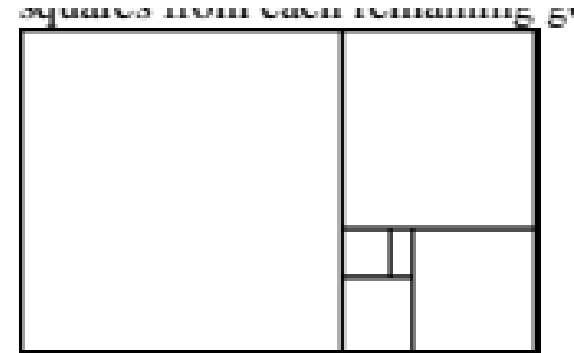
- Pseudo random Clouds of Dots



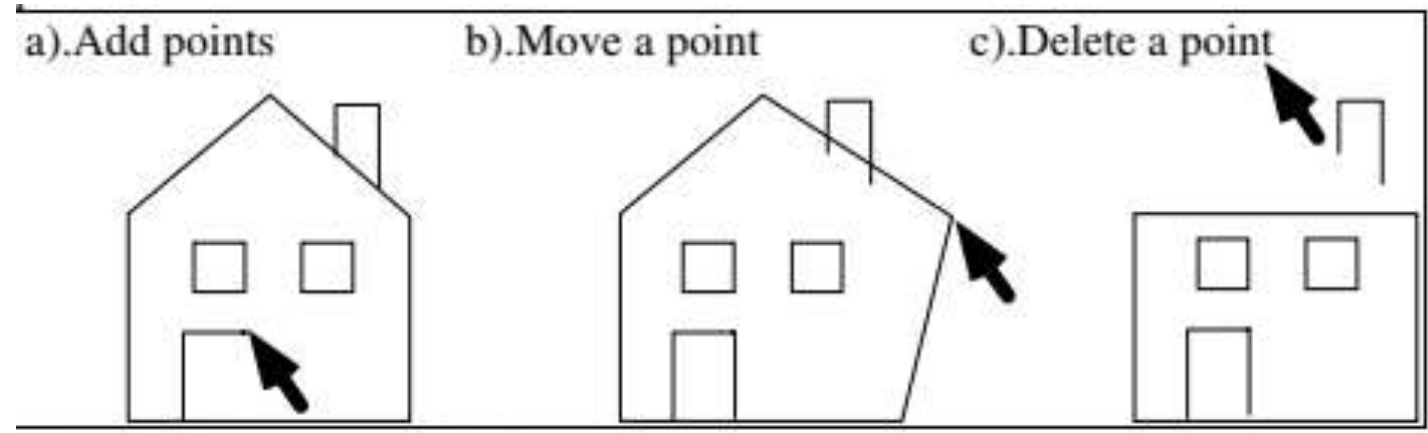
- The Gingerbread Man.



- **The Golden Ratio**



- **Polyline Editor.**





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Thank you