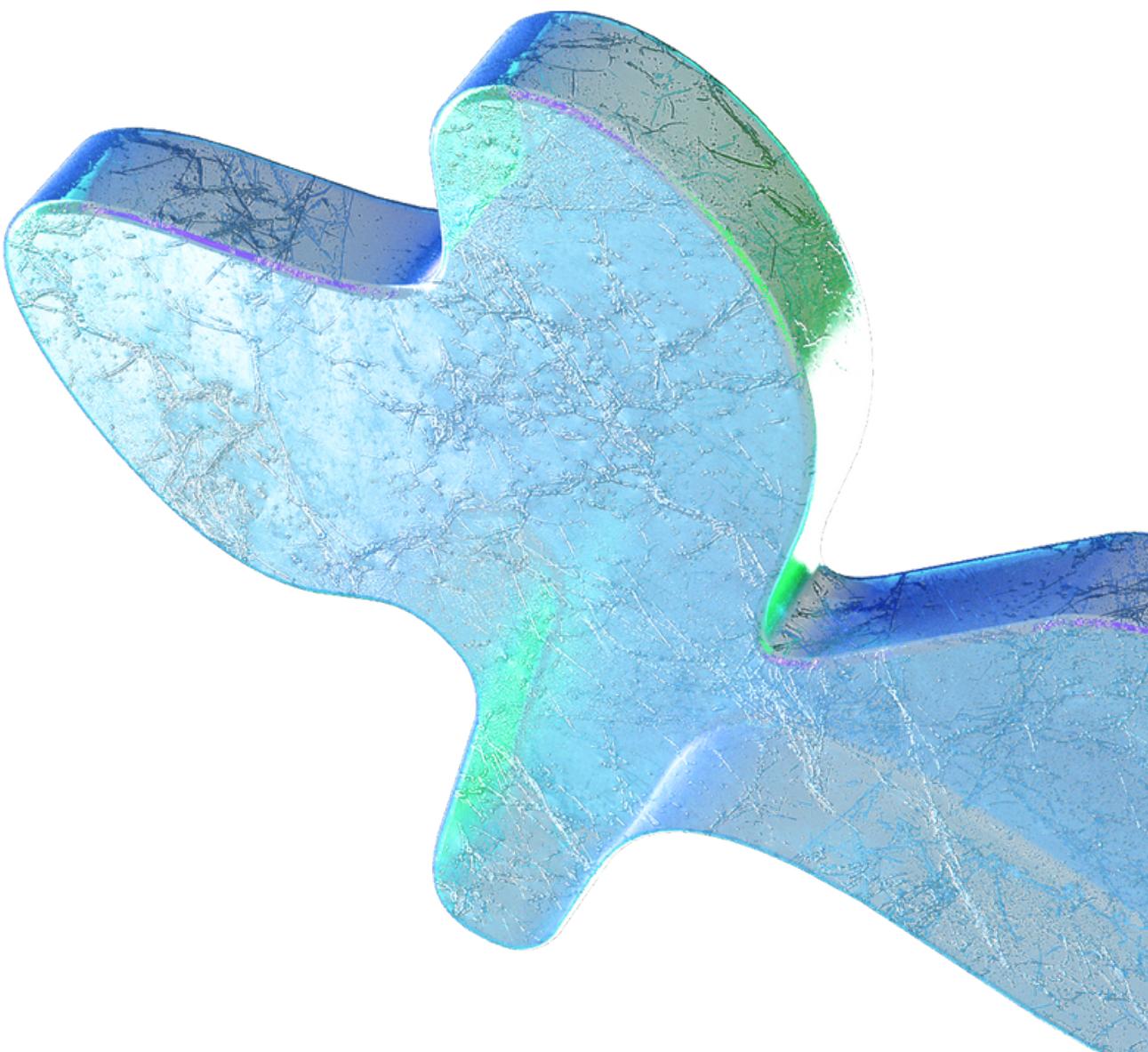




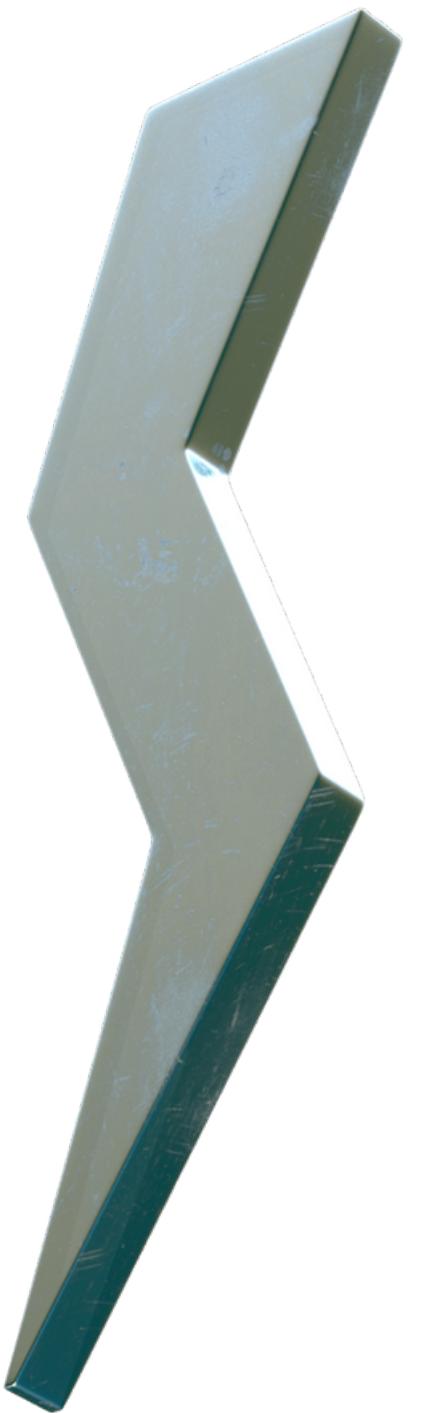
Z - Kurven

Team 223 – SS23

Pascal Gaertner – Tushar Khandelwal – Shaurya Sharma



Inhalt



Anwendungen

Z Kurve: Einführung

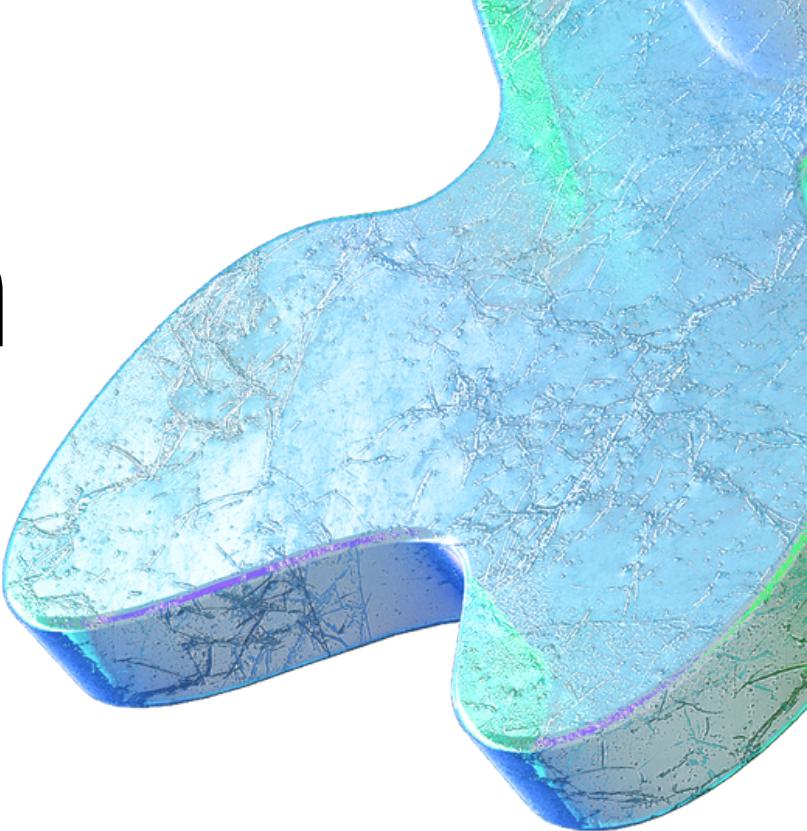
Optimierungen

Performanzanalyse

Korrektheit

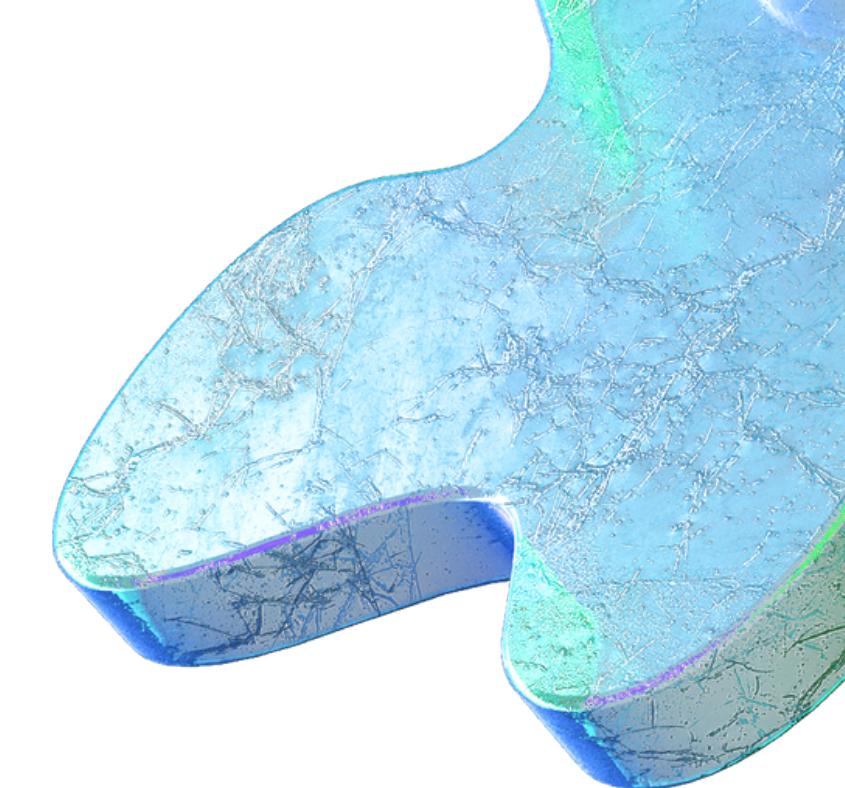
Quellen

Z-Kurve und ihre Anwendungen

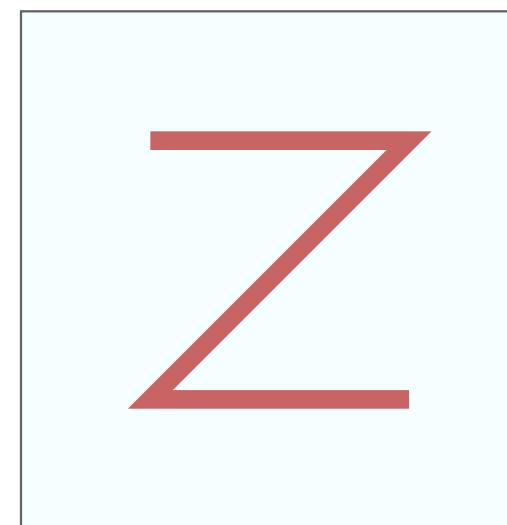


- Abbildung mehrdimensionaler Daten in eine eindimensionale Sequenz
- Cache-Optimierung
- Darstellung geografischer Daten
- Datenvisualisierung mit Hilfe der Z-Kurve
- Verbesserung der Effizienz räumlicher Abfragen in Datenbanken

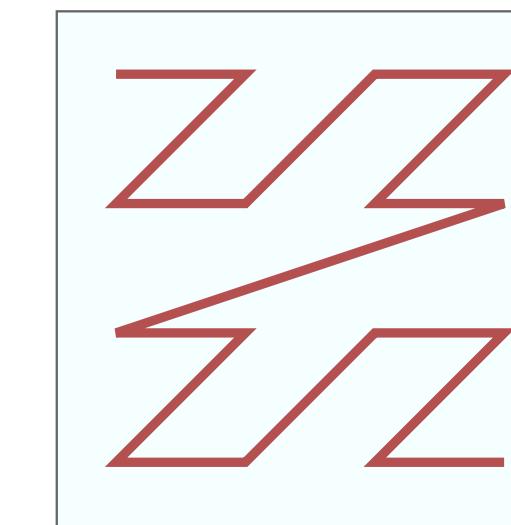
Z-Kurve : Erklärung



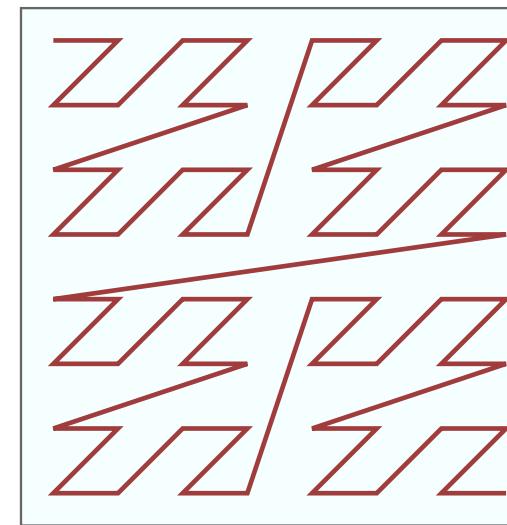
Grad 4 der Z-Kurve



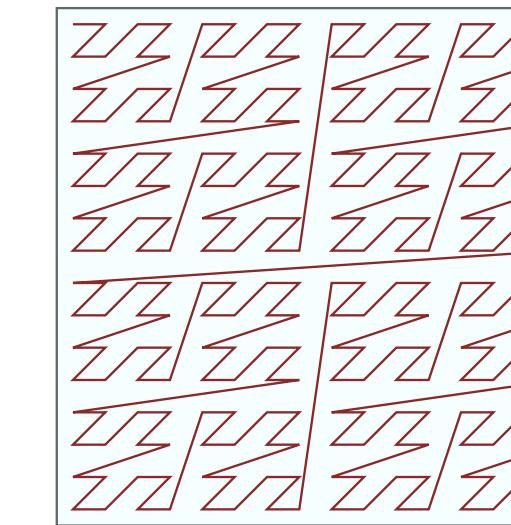
Grad 1



Grad 2



Grad 3

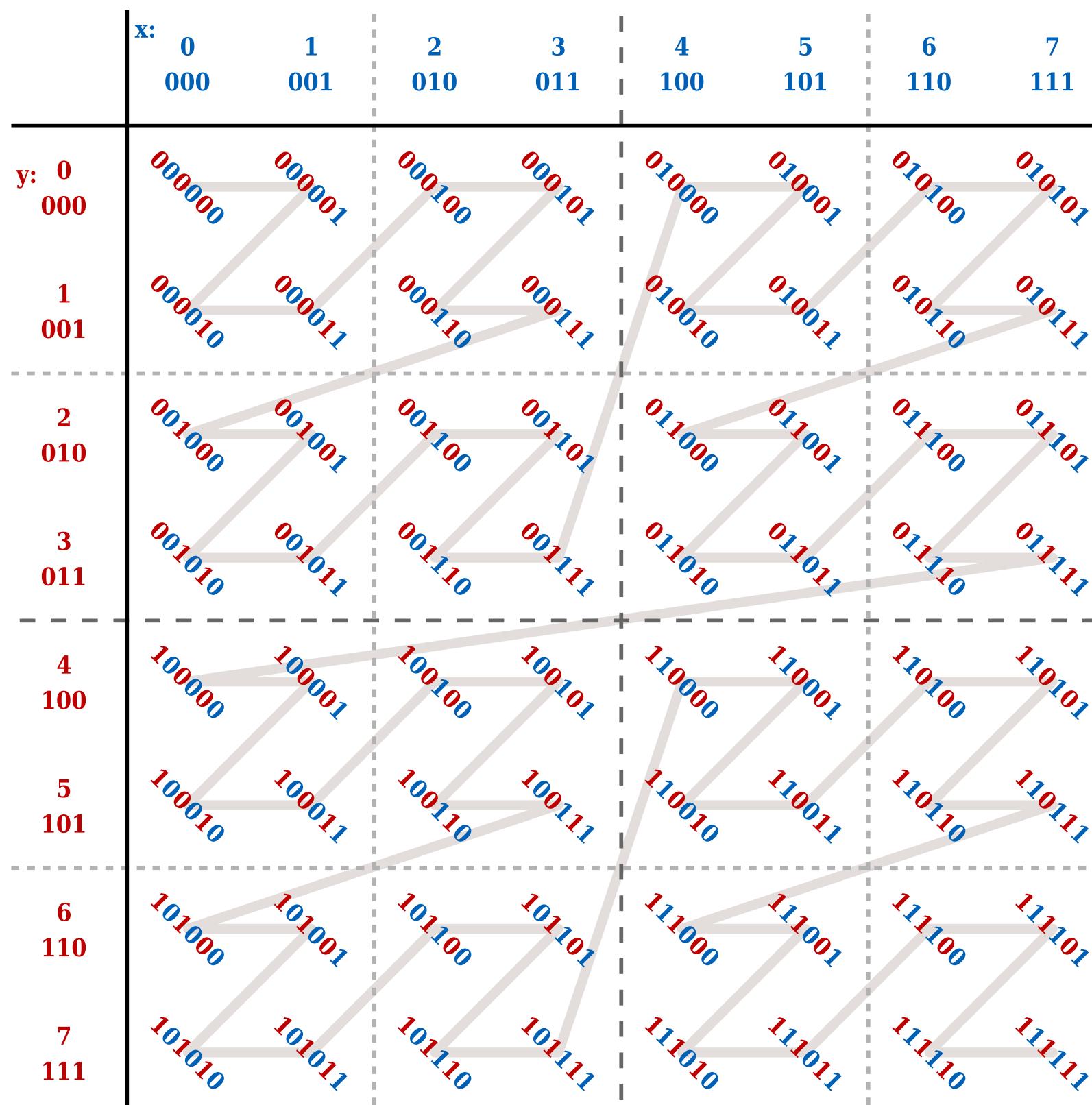
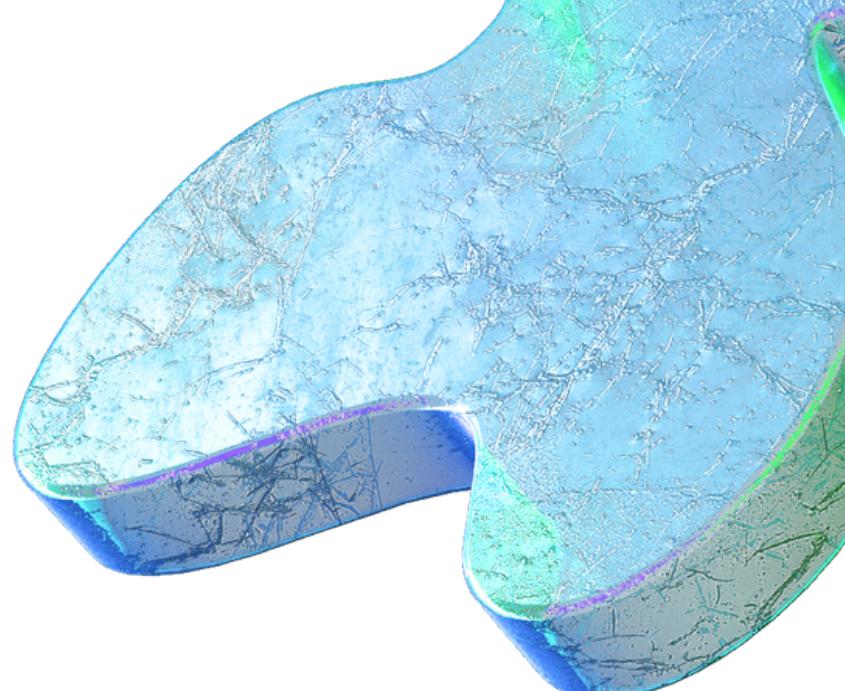


Grad 4

Z-Kurve Matrix

+	0	1	4	5	16	17	20	21
0	0	1	4	5	16	17	20	21
2	2	3	6	7	18	19	22	23
8	8	9	12	13	24	25	28	29
10	10	11	14	15	26	27	30	31
32	32	33	36	37	48	49	52	53
34	34	35	38	39	50	51	54	55
40	40	41	44	45	56	57	60	61
42	42	43	46	47	58	59	62	63

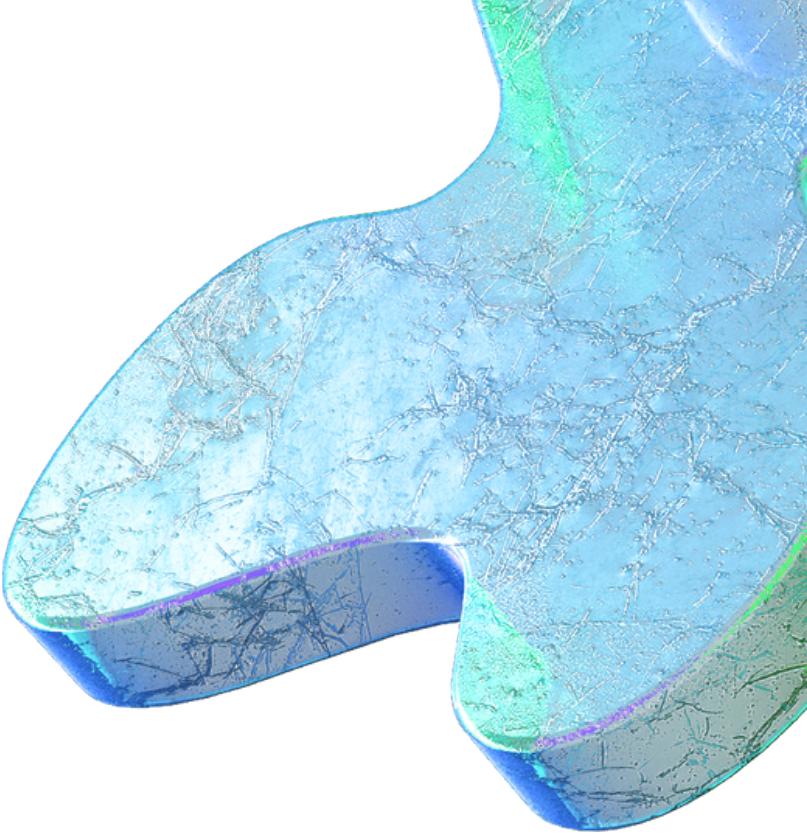
Z-Kurve : Verzahnung von Bits



$$\begin{aligned} x &= 0b10011 = 19 \\ z \&\& y \\ &= 0b100110101111 = 2479 \\ &= 0b101111 = 47 \end{aligned}$$

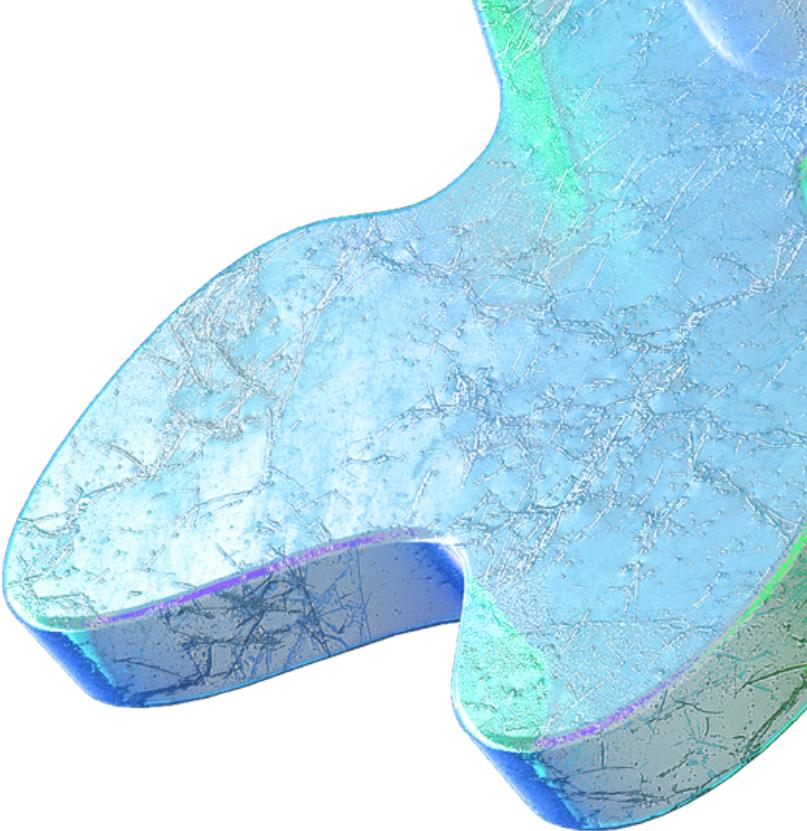
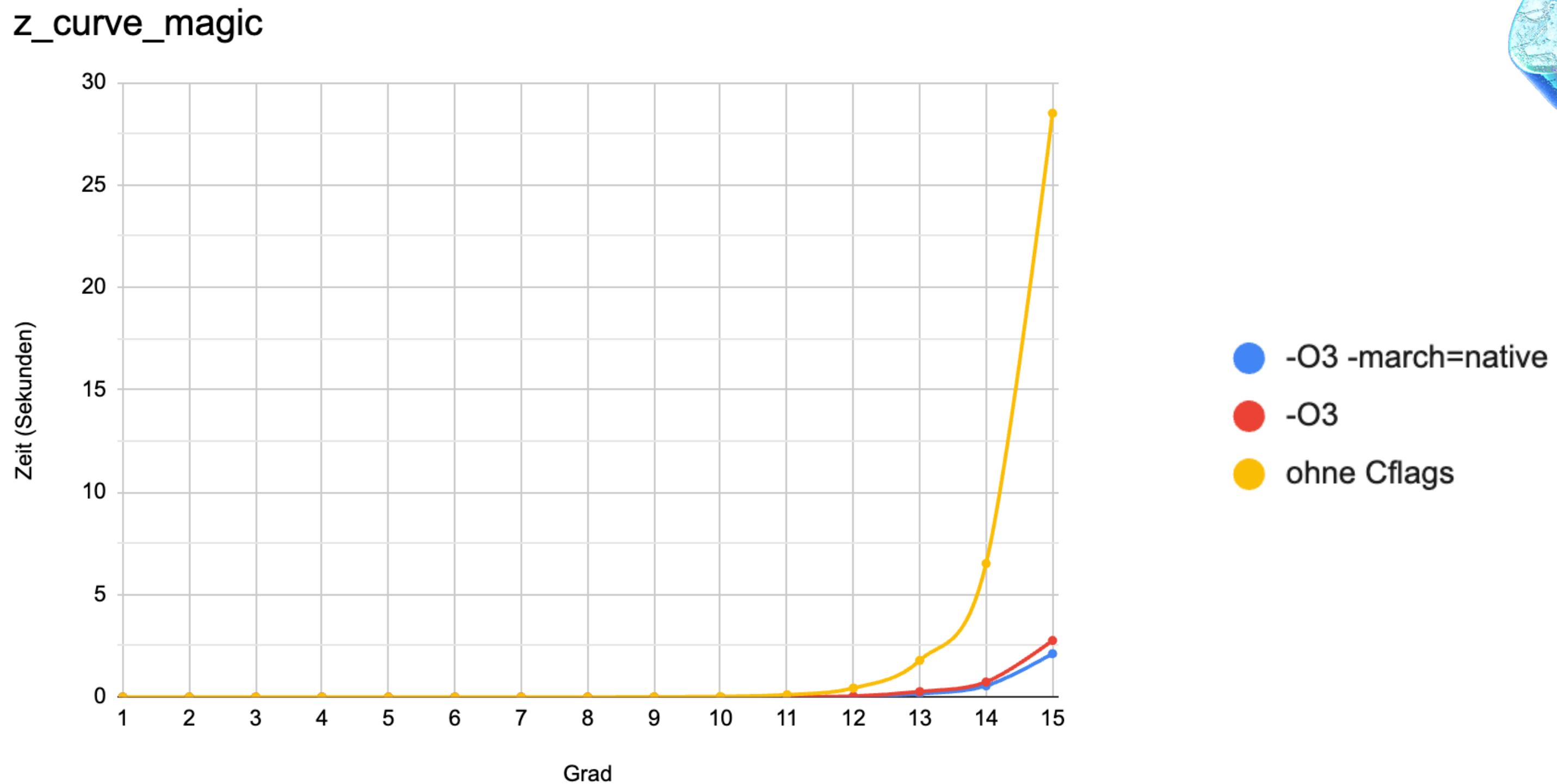
OPTIMIERUNGEN

Z-Kurve Methode und Implementierungen



- `z_curve_magic`
- `z_curve_magic_simd`
- `z_curve_recursive`
- `z_curve_iterative_simd`
- `z_curve_iterative`

Optimierung mit Hilfe von Cflags

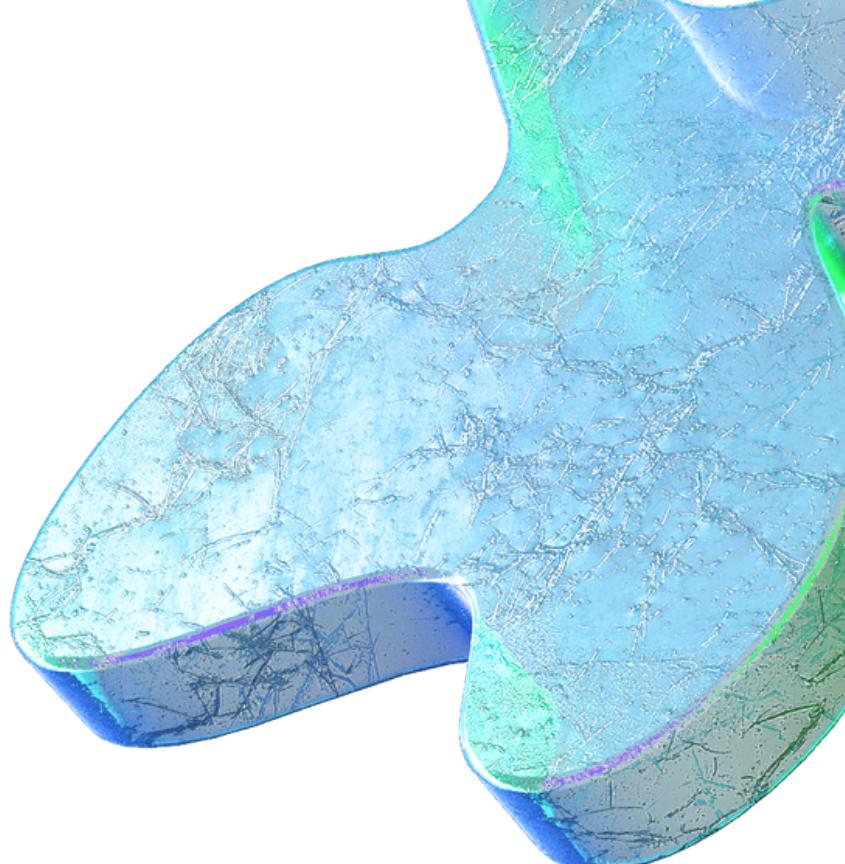


PERFORMANZANALYSE

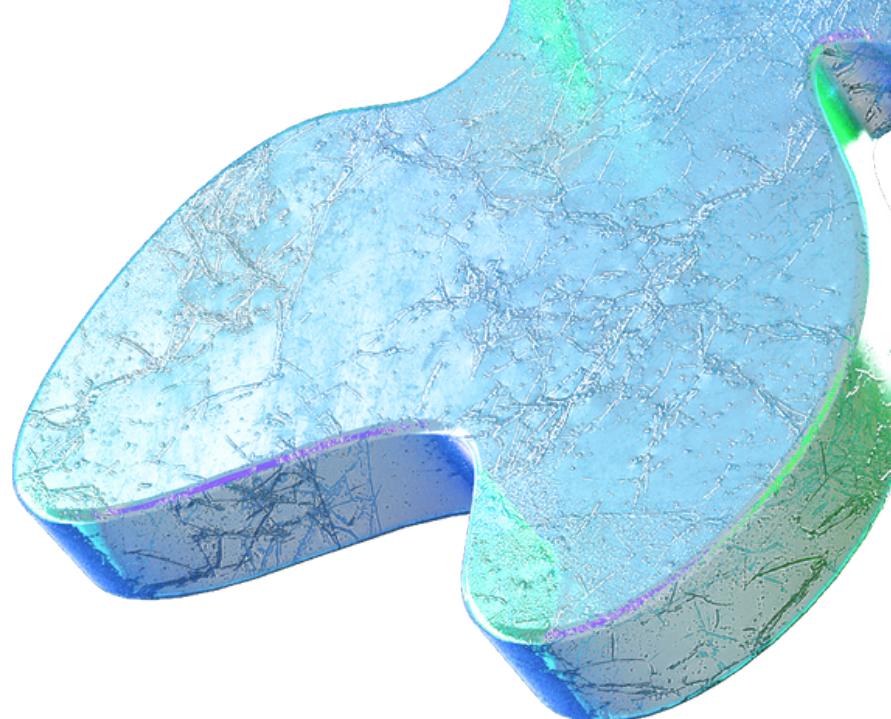
Testplattform : Rechnerhalle

Hardware:

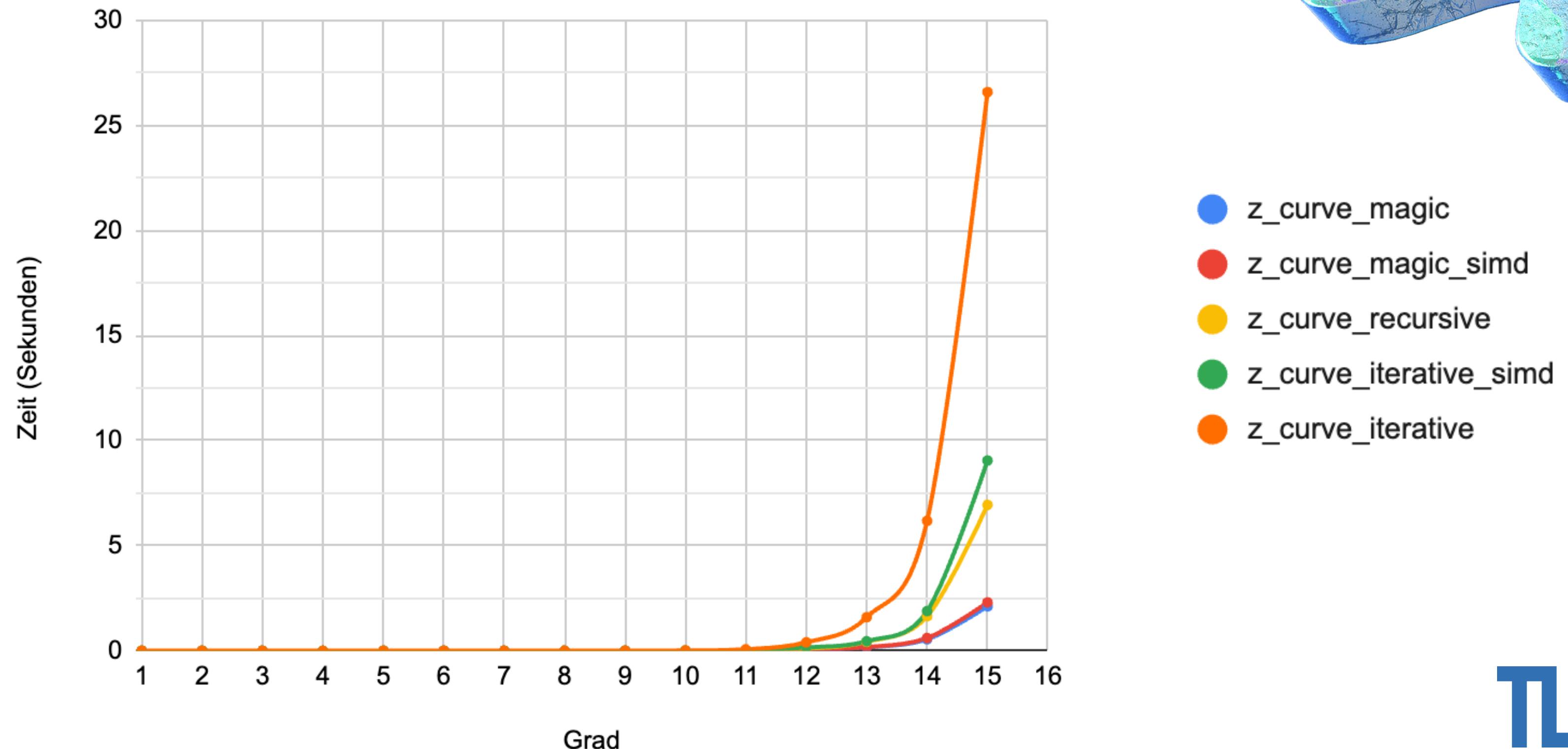
- Architektur: **x86_64**
- CPU: **Intel(R) Xeon(R) CPU E5-2687W v3 @ 3.10GHz**
- Betriebssystem: **Ubuntu 22.04.1 LTS**
- CFLAGS: **-O3 -march=native**



Grafik der Laufzeit verschiedener Methoden



Z-Kurve Graph



KORREKTHEIT

QUELLEN

- [Slide 4] David Eppstein. Z-Kurve. Wikipedia, July 2008.
https://de.wikipedia.org/wiki/Datei:Four-level_Z.svg, visited 2023-07-14.
- [Slide 4] David Eppstein. Z-Kurve. Wikipedia, November 2016.
https://commons.wikimedia.org/wiki/File:Moser%20%93de_Bruijn_addition.svg,
visited 2023-07-14
- [Slide 5] Nomen4Omenn. Z-Kurve. Wikipedia, November 2017.
<https://de.wikipedia.org/wiki/Datei:Z-curve45.svg>, visited 2023-07-14
- [Slide 5] Nomen4Omen. Z-Kurve. Wikipedia, April 2022.
<https://de.wikipedia.org/wiki/Datei:Zcurve45bits.png>, visited 2023-07-14.

**Danke für Ihre
Aufmerksamkeit**

