

```
{
  "name" : "Kiwi",
  "group" : "Fruits",
  "subgroup" : "Tropical fruits",
  "nutrients" : {
    "Carbohydrate" : 20945.0,
    "Energy" : 176.0,
    "Fat" : 1955.0,
    "Fiber" : 1925.0,
    "Proteins" : 1421.3
  },
  "description" : "
    The kiwifruit, often shortened to kiwi in many parts of the world,
    is the edible berry of a woody vine in the genus Actinidia.
    The most common cultivar group of kiwifruit (''Hayward'') is oval,
    about the size of a large hen''s egg (5?8 centimetres in length
    and 4.5?5.5 centimetres in diameter). It has a fibrous, dull
    greenish-brown skin and bright green or golden flesh with rows of
    tiny, black, edible seeds. The fruit has a soft texture and a sweet
    but unique flavor, and today is a commercial crop in several
    countries, such as Italy, New Zealand, Chile, Greece and France.
    "
}
```

JSON Types	<a href="https://www.postgresql.org/docs/14/datatype-json.html">https://www.postgresql.org/docs/14/datatype-json.html</a>
JSON Functions and Operators	<a href="https://www.postgresql.org/docs/14/functions-json.html">https://www.postgresql.org/docs/14/functions-json.html</a>
JSONPATH Type	<a href="https://www.postgresql.org/docs/14/datatype-json.html#DATATYPE-JSONPATH">https://www.postgresql.org/docs/14/datatype-json.html#DATATYPE-JSONPATH</a>
SQL/JSON Path Language	<a href="https://www.postgresql.org/docs/14/functions-json.html#FUNCTIONS-SQLJSON-PATH">https://www.postgresql.org/docs/14/functions-json.html#FUNCTIONS-SQLJSON-PATH</a>

```
create table food (  
  doc jsonb  
);
```

```
insert into food values('{  
  "name" : "Kiwi",  
  "group" : "Fruits",  
  "subgroup" : "Tropical fruits",  
  "nutrients" : {  
    "Carbohydrate" : 20945.0,  
    "Energy" : 176.0,  
    "Fat" : 1955.0,  
    "Fiber" : 1925.0,  
    "Proteins" : 1421.3  
  },  
  "description" : "  
    The kiwifruit, often shortened to kiwi in many parts of the world,  
    is the edible berry of a woody vine in the genus Actinidia.  
    The most common cultivar group of kiwifruit (''Hayward'') is oval,  
    about the size of a large hen's egg (5?8 centimetres in length  
    and 4.5?5.5 centimetres in diameter). It has a fibrous, dull  
    greenish-brown skin and bright green or golden flesh with rows of  
    tiny, black, edible seeds. The fruit has a soft texture and a sweet  
    but unique flavor, and today is a commercial crop in several  
    countries, such as Italy, New Zealand, Chile, Greece and France.  
  "  
}');
```

```
select doc from food;
```

 doc





```
{"name": "Kiwi", "group": "Fruits", "subgroup": "Tropical fruits", "nutrients": {"Fat": 1955.0, "Fiber": 1925.0, "Energy": 100.0}, "calories": 100}, {"name": "Onion", "group": "Vegetables", "subgroup": "Onion-family vegetables", "nutrients": {"Fat": 0.0, "Fiber": 1.7, "Energy": 40.0}, "calories": 40}, {"name": "Garlic", "group": "Herbs and Spices", "subgroup": "Herbs", "nutrients": {"Fat": 0.0, "Fiber": 3850.000, "Energy": 100.0}, "calories": 100}, {"name": "Cashew nut", "group": "Nuts", "subgroup": "Nuts", "nutrients": {"Fat": 15466.667, "Fiber": 2381.818, "Energy": 100.0}, "calories": 100}, {"name": "Pineapple", "group": "Fruits", "subgroup": "Tropical fruits", "nutrients": {"Fat": 2188.600, "Fiber": 705.263, "Energy": 100.0}, "calories": 100}, {"name": "Peanut", "group": "Nuts", "subgroup": "Nuts", "nutrients": {"Fat": 14543.900, "Fiber": 6891.892, "Energy": 100.0}, "calories": 100}, {"name": "Horseradish", "group": "Herbs and Spices", "subgroup": "Spices", "nutrients": {"Fat": 700.000, "Fiber": 3000.000, "Energy": 100.0}, "calories": 100}, {"name": "Asparagus", "group": "Vegetables", "subgroup": "Shoot vegetables", "nutrients": {"Fat": 2150.000, "Fiber": 1000.000, "Energy": 100.0}, "calories": 100}, {"name": "Brazil nut", "group": "Nuts", "subgroup": "Nuts", "nutrients": {"Fat": 67459.500, "Fiber": 4266.667, "Energy": 100.0}, "calories": 100}, {"name": "Common beet", "group": "Vegetables", "subgroup": "Leaf vegetables", "nutrients": {"Fat": 0.0, "Fiber": 1.0, "Energy": 100.0}, "calories": 100}
```

```
select
  doc->>'name' as fname,
  doc->>'group' as fgroup,
  doc->'nutrients' as nutrients
from food;
```

ABC fname	ABC fgroup	📄 nutrients
Kiwi	Fruits	{"Fat": 1955.0, "Fiber": 1925.0, "Energy": 176.0, "Proteins": 1421.3, "Carbohydrate": 20945.0}
Onion	Vegetables	{"Fat": 0.0, "Fiber": 2296.154, "Energy": 345.333, "Proteins": 2150.741, "Carbohydrate": 18057.407}
Garlic	Herbs and Spices	{"Fat": 0.0, "Fiber": 3850.000, "Energy": 770.333, "Proteins": 8301.667, "Carbohydrate": 50898.333}
Cashew nut	Nuts	{"Fat": 15466.667, "Fiber": 2381.818, "Energy": 1622.625, "Proteins": 13402.857, "Carbohydrate": 33540.993}
Pineapple	Fruits	{"Fat": 2188.600, "Fiber": 705.263, "Energy": 179.613, "Proteins": 542.857, "Carbohydrate": 17650.476}
Peanut	Nuts	{"Fat": 14543.900, "Fiber": 6891.892, "Energy": 1571.563, "Proteins": 22098.293, "Carbohydrate": 19706.341}
Horseradish	Herbs and Spices	{"Fat": 700.000, "Fiber": 3600.000, "Energy": 229.000, "Proteins": 4557.500, "Carbohydrate": 22922.500}
Asparagus	Vegetables	{"Fat": 2150.000, "Fiber": 1276.471, "Energy": 58.364, "Proteins": 2872.889, "Carbohydrate": 4725.000}
Brazil nut	Nuts	{"Fat": 67459.500, "Fiber": 4266.667, "Energy": 2082.000, "Proteins": 11679.000, "Carbohydrate": 11897.863}
Common beet	Vegetables	{"Fat": 0.0, "Fiber": 2327.273, "Energy": 102.500, "Proteins": 1490.000, "Carbohydrate": 9100.909}

```
select
  doc->>'name' as fname,
  (doc->'nutrients'->>'Fat')::float as fat
from food;
```

ABC fname 	123 fat 
Kiwi	1.955
Onion	0
Garlic	0
Cashew nut	15.466,667
Pineapple	2.188,6
Peanut	14.543,9
Horseradish	700
Asparagus	2.150
Brazil nut	67.459,5
Common beet	0

```
select
  doc->>'group' as fgroup,
  sum((doc->'nutrients'->>'Fat')::float) as fat
from food
group by doc->>'group';
```

ABC fgroup	123 fat
Nuts	97.470,067
Herbs and Spices	700
Fruits	4.143,6
Vegetables	2.150

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```

create table tr (
  jsondata jsonb
);

insert into tr values (
  '{
    "track": {
      "segments": [
        {
          "location": [ 47.763, 13.4034 ],
          "start time": "2018-10-14 10:05:14",
          "HR": 73
        },
        {
          "location": [ 47.706, 13.2635 ],
          "start time": "2018-10-14 10:39:21",
          "HR": 135
        }
      ]
    }
  }'
);

```

\$ ist die Wurzel des JSON-Ausdrucks

```

select
  jsonb_path_query(
    jsondata,
    '$'
  )
from tr;

{
  "track": {
    "segments": [
      {
        "HR": 73,
        "location": [
          47.763,
          13.4034
        ],
        "start time": "2018-10-14 10:05:14"
      },
      {
        "HR": 135,
        "location": [
          47.706,
          13.2635
        ],
        "start time": "2018-10-14 10:39:21"
      }
    ]
  }
}

```



Pfade werden durch "." gebildet

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments'
  )
from tr;

[
  {
    "HR": 73,
    "location": [
      47.763,
      13.4034
    ],
    "start time": "2018-10-14 10:05:14"
  },
  {
    "HR": 135,
    "location": [
      47.706,
      13.2635
    ],
    "start time": "2018-10-14 10:39:21"
  }
]
```

Zugriff auf alle Listenelemente

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*]'
  )
from tr;

{
  "HR": 73,
  "location": [
    47.763,
    13.4034
  ],
  "start time": "2018-10-14 10:05:14"
}
{
  "HR": 135,
  "location": [
    47.706,
    13.2635
  ],
  "start time": "2018-10-14 10:39:21"
}
```

Zugriff auf ein Listenelement

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[0]'
  )
from tr;

{
  "HR": 73,
  "location": [
    47.763,
    13.4034
  ],
  "start time": "2018-10-14 10:05:14"
}
```

Zugriff auf Bestandteile der Listenelemente

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*].location'
  )
from tr;
```

```
[47.763, 13.4034]
[47.706, 13.2635]
```

Anwendung einer Funktion

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments.size()'
  )
from tr;
```

```
2
```

Filterausdrücke - ? (Bedingung)

@ Zugriff auf Elemente

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*].HR ? (@ > 130)'
  )
from tr;
```

135

Fortsetzung des Pfades nach der Filterung

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*] ? (@.HR > 130).\"start time\"'
  )
from tr;
```

"2018-10-14 10:39:21"

Hintereinanderschaltung von Filterausdrücken

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*] ? (@.location[1] < 13.4) ? (@.HR > 130).\"start time\"'
  )
from tr;
```

"2018-10-14 10:39:21"

Filterausdrücke auf verschiedenen Schachtelungsebenen

```
select
  jsonb_path_query(
    jsondata,
    '$.track.segments[*] ? (@.location[1] < 13.4).HR ? (@ > 130)'
  )
from tr;
```

135

Schachtelung von Filterausdrücken

```
select
  jsonb_path_query(
    jsondata,
    '$.track ? (exists(@.segments[*] ? (@.HR > 130))).segments.size()'
  )
from tr;
```

2

```
select * from gm;
```

	kunden
1	{"kname": "Hampe", "bestellungen": [{"produkt": [{"bez": "Dennis-Klappstuhl", "laenge": null}], "gesa
2	{"kname": "Eck", "bestellungen": [{"produkt": [{"bez": "Lucca-Esstisch", "laenge": null}, {"bez": "Stehti
3	{"kname": "Gleich", "bestellungen": [{"produkt": [{"bez": "Picknicktisch/Bank-Kombination", "laenge"
4	{"kname": "Haenel", "bestellungen": [{"produkt": [{"bez": "Stehtisch eckig", "laenge": null}, {"bez": "Ga
5	{"kname": "Mann", "bestellungen": [{"produkt": [{"bez": "Larum-Esstisch", "laenge": 210}, {"bez": "Sier

```
select
  kunden->> 'kname' as kname,
  jsonb_path_query(
    kunden,
    '$.bestellungen.size()'
  )::integer as anzahl_bestellungen
from gm;
```

	ABC kname	123 anzahl_bestellungen
1	Hampe	6
2	Eck	6
3	Gleich	5
4	Haenel	6
5	Mann	6

```
select jsonb_pretty(jsonb_agg(kunden)) from gm;
```

```
[
  {
    "kname": "Hampe",
    "bestellungen": [
      {
        "produkt": [
          {
            "bez": "Dennis-Klappstuhl",
            "laenge": null
          }
        ]
      },
      {
        "gesamtpreis": 95.25,
        "bestelldatum": "2017-07-04"
      }
    ],
    {
      "produkt": [
        {
          "bez": "Stehtisch rund",
          "laenge": null
        },
        {
          "bez": "Pflanztopf Lanz",
          "laenge": null
        }
      ]
    },
    {
      "gesamtpreis": 322.25,
      "bestelldatum": "2018-05-02"
    }
  },
  {
    "produkt": [
      {
        "bez": "Lucca-Esstisch",
        "laenge": null
      }
    ],
    ...
  }
]
```

...  
589 Zeilen

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```
select jsonb_pretty (jsonb_build_object (
  'kname', kunden #> '{kname}',
  'bestellungen',
  json_build_array (
    kunden #> '{bestellungen, 0}',
    kunden #> '{bestellungen, 1}'
  )
))
from gm
where kunden->>'kname'='Hampe';

{
  "kname": "Hampe",
  "bestellungen": [
    {
      "produkt": [
        {
          "bez": "Dennis-Klappstuhl",
          "laenge": null
        }
      ],
      "gesamtpreis": 95.25,
      "bestelldatum": "2017-07-04"
    },
    {
      "produkt": [
        {
          "bez": "Stehtisch rund",
          "laenge": null
        },
        {
          "bez": "Pflanztopf Lanz",
          "laenge": null
        }
      ],
      "gesamtpreis": 322.25,
      "bestelldatum": "2018-05-02"
    }
  ]
}
```

```
select jsonb_build_object (
  'kname', kunden #> '{kname}',
  'bestellungen',
  jsonb_build_object (
    'Anzahl',
    jsonb_path_query(
      kunden,
      '$.bestellungen[0].produkt.size()'
    )
  )
) as anz_produkte
from gm;
```

	anz_produkte
1	{"kname": "Hampe", "bestellungen": {"Anzahl": 1}}
2	{"kname": "Eck", "bestellungen": {"Anzahl": 6}}
3	{"kname": "Gleich", "bestellungen": {"Anzahl": 3}}
4	{"kname": "Haenel", "bestellungen": {"Anzahl": 6}}
5	{"kname": "Mann", "bestellungen": {"Anzahl": 4}}

#> Zugriff auf Elemente über einen Pfad

```
select kunden->>'kname',
       jsonb_path_query(
         kunden,
         '$.bestellungen[*] ? (@.gesamtpreis > 300).produkt.bez ? (@ like_regex "tisch$")'
       ):: text
from gm;
```

	ABC ?column?	ABC jsonb_path_query
1	Hampe	"Lucca-Esstisch"
2	Hampe	"Siena-Esstisch"
3	Hampe	"Draan Standard Planztisch"
4	Eck	"Lucca-Esstisch"
5	Eck	"Merlin Pflanztisch"
6	Eck	"Merlin Pflanztisch"
7	Gleich	"Siena-Esstisch"
8	Haenel	"Siena-Esstisch"
9	Haenel	"Draan Standard Planztisch"
10	Haenel	"Siena-Esstisch"
11	Mann	"Merlin Pflanztisch"