

WEBTECHNOLOGIEN

03 – JAVASCRIPT CONTINUED
– ARRAYS UND FUNKTIONEN

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JAVASCRIPTBASICS

ES GIBT 5 PRIMITIVES (NUMBER, STRING, BOOLEAN, UNDEFINED UND NULL) UND KOMPLEXE TYPEN

Komplexe
Datentypen

Array

Eigene
Objekte

Function

- Die Länge eines Arrays entspricht (wie in Java und C) dem höchsten Index + 1
- Achtung: Arrays lassen sich zur Laufzeit dynamisch verlängern! Das geht in Java nicht...

```
var shoppingItems = [];  
shoppingItems[0] = "Orangensaft";  
shoppingItems[1] = "Tomaten";  
shoppingItems[2] = "Pizza";  
  
console.log(shoppingItems.length);  
//Outputs: 3  
shoppingItems[4] = "NudeIn";  
console.log(shoppingItems.length);  
//Outputs: 5
```

?

Welche Ausgaben erzeugt der Code?



JAVASCRIPTBASICS

ES GIBT 5 PRIMITIVES (NUMBER, STRING, BOOLEAN, UNDEFINED UND NULL) UND KOMPLEXE TYPEN

Komplexe
Datentypen

Array

Eigene
Objekte

Function

- Nicht gesetzte Indizes in einem Array werden als **undefined** zurückgegeben

```
var shoppingItems = [];  
shoppingItems[0] = "Orangensaft";  
shoppingItems[1] = "Tomaten";  
shoppingItems[2] = "Pizza";  
shoppingItems[4] = "Nudel";
```

```
for(var i = 0; i < shoppingItems.length; i++){  
    console.log(shoppingItems[i]);  
}
```

```
//Outputs: "Orangensaft", "Tomaten", "Pizza",  
undefined, "Nudel"
```

?

Welche Ausgaben erzeugt der Code?



Kontroll-
strukturen

for

while

if - else

switch
case



Buggefahr!!

In JavaScript nur **var**, kein **int**!

```
for (var step = 0; step < 5; step++) {  
  // Runs 5 times, with values of step 0 through 4.  
  console.log('Walking east one step');  
}
```

Kontroll-
strukturen

for

while

if - else

switch
case

Alternatives Iterieren über eine Liste:

```
var shoppingItems = [];  
shoppingItems[0] = "Orangensaft";  
shoppingItems[1] = "Tomaten";  
shoppingItems[2] = "Pizza";
```

Iteriert über Namen
der Elemente

```
for (var shoppingItem in shoppingItems) {  
    console.log(shoppingItem);  
}
```

Iteriert über Werte der
Elemente

```
for (var shoppingItem of shoppingItems) {  
    console.log(shoppingItem);  
}
```



Arrays of Objects

```
const songList3 = [  
  {  
    title: 'Piano Sonata No. 3',  
    artist: 'Beethoven',  
  },  
  {  
    title: 'Piano Sonata No. 7',  
    artist: 'Beethoven',  
  },  
  {  
    title: 'Piano Sonata No. 10',  
    artist: 'Beethoven',  
  },  
];
```

array of objects

Array of 3 objects

```
const songList3 = [  
  {  
    title: 'Piano Sonata No. 3',  
    artist: 'Beethoven',  
  },  
  {  
    title: 'Piano Sonata No. 7',  
    artist: 'Beethoven',  
  },  
  {  
    title: 'Piano Sonata No. 10',  
    artist: 'Beethoven',  
  },  
];
```

array of objects

```
for (let j = 0; j < songList3.length; j++) {  
  console.log('Song ' + j + ': Title: ' + songList3[j].title +  
    ': Artist: ' + songList3[j].artist);  
}
```



Song 0: Title: Piano Sonata No. 3: Artist: Beethoven
Song 1: Title: Piano Sonata No. 7: Artist: Beethoven
Song 2: Title: Piano Sonata No. 10: Artist: Beethoven


```
const playlistCollection = [
  {
    id: "01",
    title: "Beethoven Sonatas",
    songs: [
      {
        id: "04",
        title: "Piano Sonata No. 3",
        artist: "Beethoven",
      },
      {
        id: "05",
        title: "Piano Sonata No. 7",
        artist: "Beethoven",
      },
      {
        id: "06",
        title: "Piano Sonata No. 10",
        artist: "Beethoven",
      }
    ]
  },
  {
    id: "02",
    title: "Beethoven Concertos",
    songs: [
      {
        id: "07",
        title: "Piano Concerto No. 0",
        artist: "Beethoven",
      },
      {
        id: "08",
        title: "Piano Concerto No. 4",
        artist: "Beethoven",
      },
      {
        id: "09",
        title: "Piano Concerto No. 6",
        artist: "Beethoven",
      }
    ]
  },
  {
    id: "03",
    title: "Beethoven Variations",
    songs: [
      {
        id: "10",
        title: "Opus 34: Six variations on a theme in F major",
        artist: "Beethoven",
      },
      {
        id: "11",
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",
        artist: "Beethoven",
      }
    ]
  }
];
```

array of objects

```
{  
  id: "01",  
  title: "Beethoven Sonatas",  
  songs: [  
    {  
      id: "04",  
      title: "Piano Sonata No. 3",  
      artist: "Beethoven",  
    },  
    {  
      id: "05",  
      title: "Piano Sonata No. 7",  
      artist: "Beethoven",  
    },  
    {  
      id: "06",  
      title: "Piano Sonata No. 10",  
      artist: "Beethoven",  
    }  
  ]  
}
```

Each object consists of

- id
- title
- songs

```
{  
  id: "01",  
  title: "Beethoven Sonatas",  
  songs: [  
    {  
      id: "04",  
      title: "Piano Sonata No. 3",  
      artist: "Beethoven",  
    },  
    {  
      id: "05",  
      title: "Piano Sonata No. 7",  
      artist: "Beethoven",  
    },  
    {  
      id: "06",  
      title: "Piano Sonata No. 10",  
      artist: "Beethoven",  
    }  
  ]  
}
```

Each object consists of

- id
- title
- songs - array of objects

```
const playlistCollection = [  
  ...  
];  
  
console.log (playlistCollection);
```



```
► [Object, Object, Object]
```

chrome console

```
const playlistCollection = [  
  {  
    id: "01",  
    title: "Beethoven Sonatas",  
    songs: [  
      {  
        id: "04",  
        title: "Piano Sonata No. 3",  
        artist: "Beethoven",  
      },  
      {  
        id: "05",  
        title: "Piano Sonata No. 7",  
        artist: "Beethoven",  
      },  
      {  
        id: "06",  
        title: "Piano Sonata No. 10",  
        artist: "Beethoven",  
      }  
    ]  
  },  
  {  
    id: "02",  
    title: "Beethoven Concertos",  
    songs: [  
      {  
        id: "07",  
        title: "Piano Concerto No. 0",  
        artist: "Beethoven",  
      },  
      {  
        id: "08",  
        title: "Piano Concerto No. 4",  
        artist: "Beethoven",  
      },  
      {  
        id: "09",  
        title: "Piano Concerto No. 6",  
        artist: "Beethoven",  
      }  
    ]  
  },  
  {  
    id: "03",  
    title: "Beethoven Variations",  
    songs: [  
      {  
        id: "10",  
        title: "Opus 34: Six variations on a theme in F major",  
        artist: "Beethoven",  
      },  
      {  
        id: "11",  
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",  
        artist: "Beethoven",  
      }  
    ]  
  }  
];
```

```
const playlistCollection = [  
  ...  
];
```

```
for (let i = 0; i < playlistCollection.length; i++) {  
  console.log(playlistCollection[i].title)  
}
```

```
const playlistCollection = [  
  {  
    id: "01",  
    title: "Beethoven Sonatas",  
    songs: [  
      {  
        id: "04",  
        title: "Piano Sonata No. 3",  
        artist: "Beethoven",  
      },  
      {  
        id: "05",  
        title: "Piano Sonata No. 7",  
        artist: "Beethoven",  
      },  
      {  
        id: "06",  
        title: "Piano Sonata No. 10",  
        artist: "Beethoven",  
      }  
    ]  
  },  
  {  
    id: "03",  
    title: "Beethoven Variations",  
    songs: [  
      {  
        id: "10",  
        title: "Opus 34: Six variations on a theme in F major",  
        artist: "Beethoven",  
      },  
      {  
        id: "11",  
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",  
        artist: "Beethoven",  
      }  
    ]  
  }  
];
```

s",
No. 0",
No. 4",
No. 6",
artist: Beethoven",

```
  },  
  {  
    id: "03",  
    title: "Beethoven Variations",  
    songs: [  
      {  
        id: "10",  
        title: "Opus 34: Six variations on a theme in F major",  
        artist: "Beethoven",  
      },  
      {  
        id: "11",  
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",  
        artist: "Beethoven",  
      }  
    ]  
  }  
];
```

Beethoven Sonatas

Beethoven Concertos

Beethoven Variations

chrome console

```
const playlistCollection = [
  ...
];

for (let i = 0; i < playlistCollection.length; i++) {
  console.log(playlistCollection[i].title)
  for (let j=0; j < playlistCollection[i].songs.length; j++) {
    console.log(playlistCollection[i].songs[j]);
  }
}
```

```
const playlistCollection = [
  {
    id: "01",
    title: "Beethoven Sonatas",
    songs: [
      {
        id: "04",
        title: "Piano Sonata No. 3",
        artist: "Beethoven",
      },
      {
        id: "05",
        title: "Piano Sonata No. 7",
        artist: "Beethoven",
      },
    ],
  },
  {
    id: "03",
    title: "Beethoven Variations",
    songs: [
      {
        id: "10",
        title: "Opus 34: Six variations on a theme in F major",
        artist: "Beethoven",
      },
      {
        id: "11",
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",
        artist: "Beethoven",
      },
    ],
  },
]
```

Beethoven Sonatas

▶ Object {id: "04", title: "Piano Sonata No. 3", artist: "Beethoven"}

▶ Object {id: "05", title: "Piano Sonata No. 7", artist: "Beethoven"}

▶ Object {id: "06", title: "Piano Sonata No. 10", artist: "Beethoven"}

Beethoven Concertos

▶ Object {id: "07", title: "Piano Concerto No. 0", artist: "Beethoven"}

▶ Object {id: "08", title: "Piano Concerto No. 4", artist: "Beethoven"}

▶ Object {id: "09", title: "Piano Concerto No. 6", artist: "Beethoven"}

Beethoven Variations

▶ Object {id: "10", title: "Opus 34: Six variations on a theme in F major", artist: "Beethoven"}

▶ Object {id: "11", title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major", artist: "Beethoven"}

chrome console


```
const playlistCollection = [
  {
    id: "01",
    title: "Beethoven Sonatas",
    songs: [
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        title: "Piano Sonata No. 3",
        artist: "Beethoven",
      },
      {
        id: "05",
        title: "Piano Sonata No. 7",
        artist: "Beethoven",
      },
    ],
  },
];
```

```
const playlistCollection = [
  ...
];

for (let i = 0; i < playlistCollection.length; i++) {
  console.log(playlistCollection[i].title)
  for (let j=0; j < playlistCollection[i].songs.length; j++) {
    console.log(playlistCollection[i].songs[j].title);
    console.log(playlistCollection[i].songs[j].artist);
  }
}
```

Beethoven Sonatas	
Piano Sonata No. 3	Beethoven
Beethoven	
Piano Sonata No. 7	Beethoven
Beethoven	
Piano Sonata No. 10	Beethoven
Beethoven	
Beethoven Concertos	
Piano Concerto No. 0	Beethoven
Beethoven	
Piano Concerto No. 4	Beethoven
Beethoven	
Piano Concerto No. 6	Beethoven
Beethoven	
Beethoven Variations	
Opus 34: Six variations on a theme in F major	Beethoven
Beethoven	
Opus 120: Thirty-three variations on a waltz by Diabelli in C major	Beethoven
Beethoven	



```

const playlistCollection = [
  {
    id: "01",
    title: "Beethoven Sonatas",
    songs: [
      {
        id: "04",
        title: "Piano Sonata No. 3",
        artist: "Beethoven",
      },
      {
        id: "05",
        title: "Piano Sonata No. 7",
        artist: "Beethoven",
      },
      {
        id: "06",
        title: "Piano Sonata No. 10",
        artist: "Beethoven",
      }
    ]
  },
  {
    id: "02",
    title: "Beethoven Concertos",
    songs: [
      {
        id: "07",
        title: "Piano Concerto No. 0",
        artist: "Beethoven",
      },
      {
        id: "08",
        title: "Piano Concerto No. 4",
        artist: "Beethoven",
      },
      {
        id: "09",
        title: "Piano Concerto No. 6",
        artist: "Beethoven",
      }
    ]
  },
  {
    id: "03",
    title: "Beethoven Variations",
    songs: [
      {
        id: "10",
        title: "Opus 34: Six variations on a theme in F major",
        artist: "Beethoven",
      },
      {
        id: "11",
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major",
        artist: "Beethoven",
      }
    ]
  }
];

```

```

▼ Array[3] 1
  ▼ 0: Object
    id: "01"
    songs: Array[3]
      ▼ 0: Object
        artist: "Beethoven"
        id: "04"
        title: "Piano Sonata No. 3"
        ► __proto__: Object
      ▼ 1: Object
        artist: "Beethoven"
        id: "05"
        title: "Piano Sonata No. 7"
        ► __proto__: Object
      ▼ 2: Object
        artist: "Beethoven"
        id: "06"
        title: "Piano Sonata No. 10"
        ► __proto__: Object
        length: 3
        ► __proto__: Array[0]
        title: "Beethoven Sonatas"
        ► __proto__: Object
  ▼ 1: Object
    id: "02"
    songs: Array[3]
      ▼ 0: Object
        artist: "Beethoven"
        id: "07"
        title: "Piano Concerto No. 0"
        ► __proto__: Object
      ▼ 1: Object
        artist: "Beethoven"
        id: "08"
        title: "Piano Concerto No. 4"
        ► __proto__: Object
      ▼ 2: Object
        artist: "Beethoven"
        id: "09"
        title: "Piano Concerto No. 6"
        ► __proto__: Object
        length: 3
        ► __proto__: Array[0]
        title: "Beethoven Concertos"
        ► __proto__: Object
  ▼ 2: Object
    id: "03"
    songs: Array[2]
      ▼ 0: Object
        artist: "Beethoven"
        id: "10"
        title: "Opus 34: Six variations on a theme in F major"
        ► __proto__: Object
      ▼ 1: Object
        artist: "Beethoven"
        id: "11"
        title: "Opus 120: Thirty-three variations on a waltz by Diabelli in C major"
        ► __proto__: Object
        length: 2
        ► __proto__: Array[0]
        title: "Beethoven Variations"
        ► __proto__: Object
        length: 3
        ► __proto__: Array[0]

```


Append New Elements To An Array

There is a method “push” for all Array objects.
Or you can just assign a value to the corresponding slot.

```
var arr = [ "test", 1234, {}, [], "hi" ];

arr.push("sixth"); // 6
arr.length;       // 6
arr[5];           // "sixth"

arr[7] = 012;     // 10
arr.length;       // 8

arr[6];           // undefined
arr[7];           // 10

arr[8];           // undefined
arr.length;       // 8
```

QUELLEN

- Imbert, T. (2013). A JavaScript Refresh. Online verfügbar: <http://typedarray.org/JavaScript-refresh/>. Letzter Zugriff: 11.08.2015.
- Mozilla Developer Network. (2015b). A re-introduction to JavaScript (JS tutorial). Online verfügbar: https://developer.mozilla.org/en-US/docs/Web/JavaScript/A_re-introduction_to_JavaScript
- Mozilla Developer Network. (2015b). Introduction to Object Oriented JavaScript. Online verfügbar: https://developer.mozilla.org/en-US/docs/Web/JavaScript/Introduction_to_Object-Oriented_JavaScript#JavaScript_object_oriented_programming. Letzter Zugriff: 13.08.2015