Integer Vector Optimizations and "Usual Arithmetic Conversions"

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Usual Arithmetic Conversions (UACs)

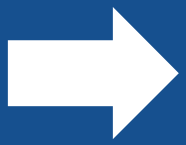
```
char a, b, c;
// ...
a = b + c;
// ...
```

```
%0 = load i8, i8* @a, align 1
%conv0 = zext i8 %0 to i32
%1 = load i8, i8* @b, align 21
%conv1 = zext i8 %1 to i32
%add = add nuw nsw i32 %conv0, %conv1
%conv2 = trunc i32 %add to i8
store i8 %conv2, i8* @c, align 1
```

Movidius

UAC Optimization

```
%0 = load i8, i8* @a, align 1
%conv0 = zext i8 %0 to i32
%1 = load i8, i8* @b, align 1
%conv1 = zext i8 %1 to i32
%add = add nuw nsw i32 %conv0, %conv1
%conv2 = trunc i32 %add to i8
store i8 %conv2, i8* @c, align 1
```



```
%0 = load i8, i8* @a, align 1
%1 = load i8, i8* @b, align 1
%2 = add i8 %1, %0
store i8 %2, i8* @c, align 1
```

Movidius

Performance Impact

- 2 tests are more than 2X slower
- 7 are more than 10% slower
- 35 are more than 5% slower

- 52 are more than 5% faster
- 82 are more than 10% faster
- 22 are more than 2X faster
- 17 are more than 5X faster
- 2 are more than 10X faster
- 1 is more than 20X faster
- 2 are more than 30X faster